IRON TRADE REVIEW AND WESTERN MACHINIST

A JOURNAL OF MANUFACTURES, HARDWARE, METALLURGY AND INVENTION.

WEEKLY EDITION. VOL. XVII—No. 30 | CLEVELAND, O., JULY 26, 1884. | MONTHLY EDITION VOL. II—No. 7.

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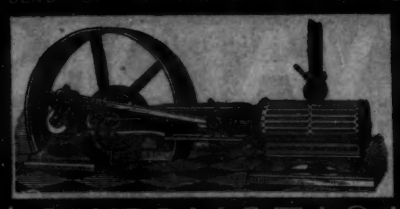

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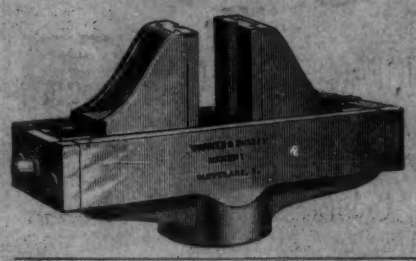

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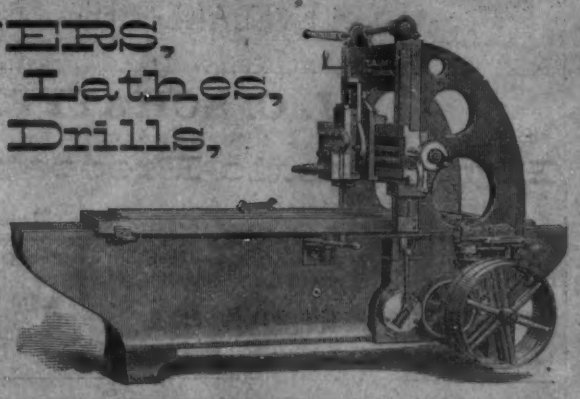

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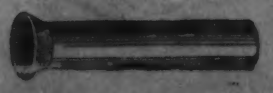

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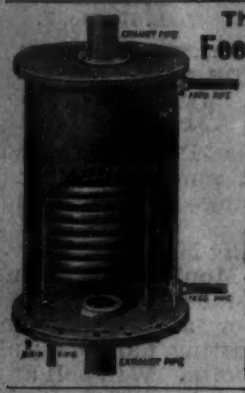

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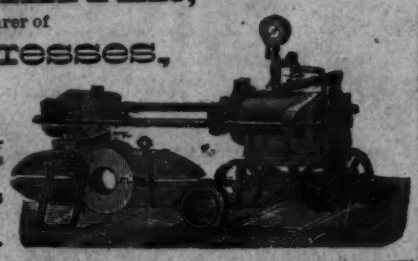

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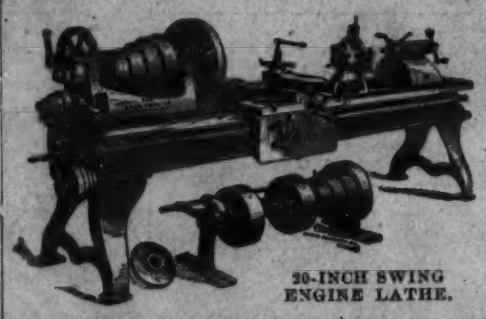

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WEEKLY EDITION. VOL. XVII—No. 30. | CLEVELAND, O., JULY 26, 1884. | MONTHLY EDITION VOL. II.—No. 7.

New Machinery.

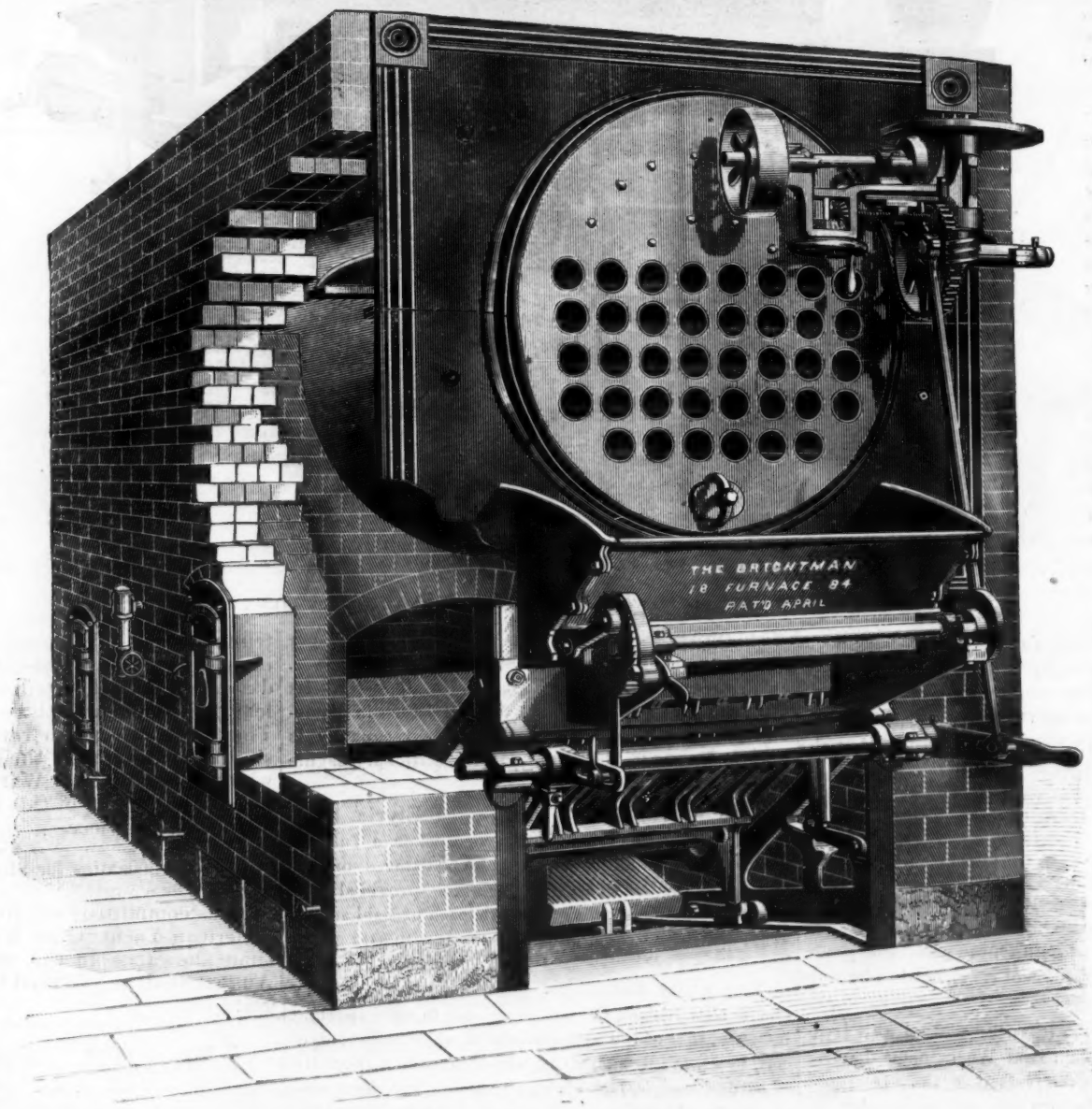
The Brightman Automatic Smokeless Furnace.

The furnace herewith illustrated is designed more especially for soft coal, and the grates are so constructed that fine coal, and even coal dust, can be burned without waste. In burning soft coal, and especially the lower grades, in ordinary furnaces dense volumes of smoke pass from the chimney, that are not only objectionable to the community at large, but involve a serious loss to the coal consumer, in that a large per cent. of the fuel passes off unconsumed and wasted. The so-called smoke consuming furnaces are too often a misnomer. Smoke cannot be burned except by degrees of heat that are entirely impracticable to maintain in an ordinary furnace. The gases, before they are condensed into smoke, may be burned under certain conditions:

First. The coal must be evenly fed to the furnace, to the end that the gases be generated only in moderate and uniform quantities, and that the fire be kept at an even and sufficient temperature to consume the gases.

Second. Heated air in suitable quantities should be commingled with the gases, to render them more inflammable.

Third. The heat of the furnace must be concentrated and raised to a high degree, and the commingled air and gases made to pass through the part where the heat is of such intensity that the said mixture of air and gases will be ignited.



THE BRIGHTMAN AUTOMATIC SMOKELESS FURNACE.

The coal is first thrown into a hopper conveniently located for the purpose, along the front of the furnace, and thence is automatically fed evenly, and in small quantities to the front part of the grate bars and without exposing any opening through which draughts of cold air can enter the furnace. The grate bars are inclined, and the coal, when first introduced, is a thin layer, and undergoes the coking process during which the gases are generated, and as the coal becomes thoroughly ignited, it is moved along by the action of the grate, and is added to the body of the fire. Just in front of the bridge-wall the fire is of such depth that the heat concentrated at this point is intense. A cross-wall, supported by an arch over the bridge-wall, cuts off the passage way along the sides of the boiler, so that the gases are compelled to pass through the limited space between the arch and bridge-wall. Air is heated by passing through the hollow bridge-wall, and thence passes through ducts in the side walls, leading to an air-chamber in the arch, whence it is discharged forward and downward in small jets to commingle with the gases just as the latter are passing over the hottest part of the fire. Just as the union occurs, the whole volume is passed through the opening of the bridge wall, in which is concentrated the heat of the furnace. The whole mass bursts into a fierce flame at the rear of the bridge-wall and the combustible gases are entirely consumed, and a large percentage of fuel is thus utilized instead of being converted into a nuisance in the form of smoke. The furnace and its attached mechanism are simple, durable, convenient, and in every way effective. The power of the grate and feed of the Brightman Furnace is driven by a belt from any angle. It consists of a friction wheel, or other device, for increasing or decreasing the speed of the grates and feed. The furnace is in use by Smith & Teachout, the Cleveland Paper Co., and the Cuyahoga Steam Furnace Co. For any information, address J. W. Brightman & Son, Cleveland, O.

IN SHARPENING edge tools substitute common bar-soap and water for oil on the hone.

Adhesion of Belts to Pulleys.

The American Woodworker.

It appears from general experience and experiments expressly made, that the nature of the surface of belts and pulleys has great influence on the ratio of strain and resistence—that is, on the slipping; but contrary to expectation, a cast-iron pulley, when turned smooth, gives no more chance for slipping than when it is rough. This is explained by the fact that the adhesion of the belt to polished smooth surfaces is as much a preventive against slipping as the friction on rough surfaces. In fact, it overbalances, in most cases, the roughness; and hence, knowing engineers place the grain or smooth side (the hair side) and not the rough side (the flesh side) of their belts in contact with the pulleys, finding that there is more adhesion and a gain of thirty per cent. When we consider that rough surfaces when in rapid motion carry air with them entrapped in their pores, and that friction depends not on the amount of surface in apparent contact, but on the amount of particles of the surface in real contact, it is quite natural that smooth surfaces should produce more friction when brought by pressure into close contact than rough surfaces, of which it is impossible to bring so many particles into contact, and which, besides, by their rapid motion will entrap among their projecting points a separating, and so to speak, lubricating stratum of air.

Boiler Lagging.

A Pittsburgh mechanic has produced a new kind of boiler lagging. This consists of layers of paper, or paper pulp formed into a corrugated sheet, with a lining of asbestos to bear on the hot surface. The intention is to make air spaces between the boiler and the lagging, and yet have a strong covering which will prevent the radiation of heat.

A FRENCH Meteorologist has in the exposed court of his house two bars of iron planted in the earth, to each of which is fixed a conductor of coated wire, terminated in a telephonic receiver. His practice is to consult the apparatus twice every day, and it never fails, through indications of earth currents, to give notice of the approach of a storm twelve to fifteen hours ahead.

"ENGINEER full; boiler empty," is the way a Western paper accounts for an accident.

Manufactures.

THE Cambria Iron Works are now making 600 tons of steel rails per day.

THE Cowles Hardware Co., of Unionville, Conn., is to remove to Bridgeport.

THE Pierce Manufacturing Co. will commence the operation of the Evaporator Works in Warren, O., early in August.

THE Buckeye Engine Co., Salem, O., report to us that they have orders ahead for 19 engines, none less than 125 H. P.

THE Akron (O.) Sewer Pipe Co. was recently awarded a $20,320 contract by the Commissioners of the District of Columbia.

MESSRS. THOMSON & MEAD, 95 River Dock, Cleveland, are organizing a joint stock company for the manufacture of a feed water purifier.

W. A. ELLIS, of Andover, O., is negotiating with the citizens of Hubbard for removing his handle factory to that place. He employs from 75 to 100 men.

THE Phœnix Foundry and Machine Works, Terre Haute, Ind., have added a new and complete boiler shop to their extensive foundry and machine works.

ONLY 17 hands are employed at present by Cunningham & Co., New Castle, Pa., founders and machinists, as against 40 hands when the works are running full. Dull trade is the cause.

THE Standard Rivet Co., Cleveland, report trade good the past two months but a little dull at present. They are figuring with New York parties on a contract of about 200 tons, with a good prospect of getting it.

THE Pittsburgh Wire and Railing Works of Taylor & Dean have been established 45 years and enjoy a trade extending pretty well over the Union. They employ 50 hands and manufacture their goods from the raw material.

THE Manning Novelty Co. is doing a handsome business, having a larger demand for its specialties than it can supply. The company will erect a large building in a short time for its own use.—[Youngstown (O.) News-Register.

IT is possible that a large blast furnace and steel works plant may be erected at Oxana, Ala. The projectors of the enterprise, who have purchased considerable property in that vicinity, are said to be practical steel workers, and their land is reported to be rich in pure Bessemer ores.

TITUSVILLE, Pa., is to have new steel and iron works, the Eames Petroleum Iron Works plant having been purchased by Burgess, Garrett & Co. It is not their intention to manufacture the ordinary grades of iron and steel but special grades of both. They also assert that they can make a self-tempering steel.

THE Washburn Iron Co., of Worcester, Mass., whose business is principally the manufacture of steel rails, has been reorganized, and it is reported that the name will be soon be changed to the Worcester Steel Co. From 150 to 200 hands will be employed, and the capacity of the works will be 200 tons of finished rails per day.

THE Pittsburgh Supply Co. have lately contracted with the North Carolina State Penitentiary for a 300-light gas machine; also with the hotel at Meyers Lake, near Canton, O., for a 100-light machine, and for lighting the Yarborough Hotel at Raleigh, N. C., besides having several other orders. The company propose to enlarge their works soon.

THE Buckeye Bridge and Boiler Co., Cleveland, are running 12 hours a day, with 65 to 70 men. They have on their books 30 spans of bridge work, ranging from 75 to 160 feet; 8 boilers, 6 feet in diameter, for the H. P. Nail Co., of Cleveland; several boilers for city school buildings; nine boilers for Chicago, and the roofing work for the Cincinnati Custom House.

WALTER S. PAYNE, of the Payne Steam Heating Co., Titusville, Pa., has, we learn, been allowed a patent on a radiator connection, under date of July 15, 1884. This invention relates to an improved means for connecting steam pipes with the radiator and has for its object to provide a device whereby disconnecting may be readily accomplished. Mr. Payne claims for his invention cheapness, simplicity and durability.

THE large engine Superior, built by E. D. Leavitt for the Calumet and Hecla Mining Company, Michigan, is running at about 60 revolutions per minute and easily furnishing about 2,000 horse power. Its cylinders are 72 and 37 inches in diameter. Its main balance band wheels are 32 feet 1 inch in diameter and take a 32 inch belt. Its nominal capacity is 4,700 horse power, being the largest stationary engine in America.

JOHN A. TOPLIFF and others, of Elyria, have recently patented a combination furnace, or a furnace which is a combination of two adjacent stoves or furnaces, and a chimney, with a single flue provided with separate openings connecting with each of said stoves, above and below their fire grates, and with said chimney.

THE white walnut abounding in the country about New Lisbon, O., has given rise to an important industry, that of the manufacture of white walnut faucets, by H. W. Briggs & Co., who also make a specialty of garden trowels, tack claws, ice mallets and many other articles of hardware. The works have been running since 1871 and employ 35 hands. Trade has not been as good this year as last, but a good Fall outlook is reported.

A LARGE three-story brick building, with basement, is being erected by the Solderless Standing-seam Conductor Co., Limited, of Allegheny, Pa., to accommodate their rapidly increasing trade. A new specialty of which this company are the patentees and sole owners, is the Wickless Oil Stove, which bids fair to produce a sensation in the oil stove market. They will manufacture this stove on a large scale as soon as they occupy their new building in the Fall.

THE North Chicago Rolling Mill Co. reports the business for the first half of this year as exceeding by from 10 to 15 per cent. that of the last half of 1883, with indications of reasonably full work the present half year. The steel rail output is now from 1,000 to 1,200 tons a day; bar iron 100 tons, and nails 1,000 kegs. The production of pig is 1,000 tons daily, all of which is used by the company. The nail mill (at Milwaukee) was erected this year, and a plant for the manufacture of steel girders, beams etc., is under way.

THE Egan Co., Cincinnati, has just completed several newly designed machines of special interest to a large number of wood-workers on account of the many fine points embodied in their construction. Among the number we may mention their fast feeding special flooring machine which will turn out a first class quality of flooring, in either hard or soft wood, at the rate of 100 lineal feet per minute. This machine is provided with three pair of large feeding rolls, and it will work stuff 9 inches or 14 inches wide by 3 inches thick, finished sizes. Their new self-feeding rip saw is well adapted for use in any factory where a large amount of ripping is to be done, as the work performed by it is much more rapid, as well as more smooth and even, than can be done by hand. The company have already placed several of each of these machines with parties who had thoroughly canvassed the market, and finally decided on the Egan Co. make. They report trade very fair at present, with a good many inquiries from foreign countries.

BRIGHTMAN AUTOMATIC SMOKELESS FURNACE—(SIDE VIEW).

A Small Engine.

One of the tiniest working models in the world was in possession of John Penn, (of Greenwich,) the eminent maker of the great engines of which it is the reduced counterpart. It stood on an English 3d. piece, and really covered less space, for its base-plate measured only three eighths of an inch. The engines were of the trunk form, introduced by Penn, the cylinders measuring one-eighth of an inch in diameter, and the trunk one-twentieth; the length of stroke was three-fortieths of an inch. They were fitted with reversing gear, and were similar in design to the great machines with which ships of the "Warrior" class are equipped. The weight of this model was less than a three-penny piece.

Mathematics for Steam Yachtsmen.

New York Sun.

The committee on time allowance of the American Yacht Club has resolved that the time allowance in the steam yacht races in August shall be governed by the following formula:

$$T = \frac{3\sqrt{G \times C}}{\sqrt[3]{\quad}} - o$$

Lest this should set any steam yachtsman wild the committee translates it as follows:

"The velocity of a vessel is assumed as the cube root of the quotient of the product of the area of her grate surface and the constant due to the character of combustion divided by the cube root of the square of her gross tonnage."

The constants are: For natural draught, 1; jet, 1.25; blast and exhaust, 1.6; The committee proposes to divide the yachts into three classes: 1. 250 gross tons or more. 2. Less than 250 and more than 100. 3. All under 100.

Boiler Practice.

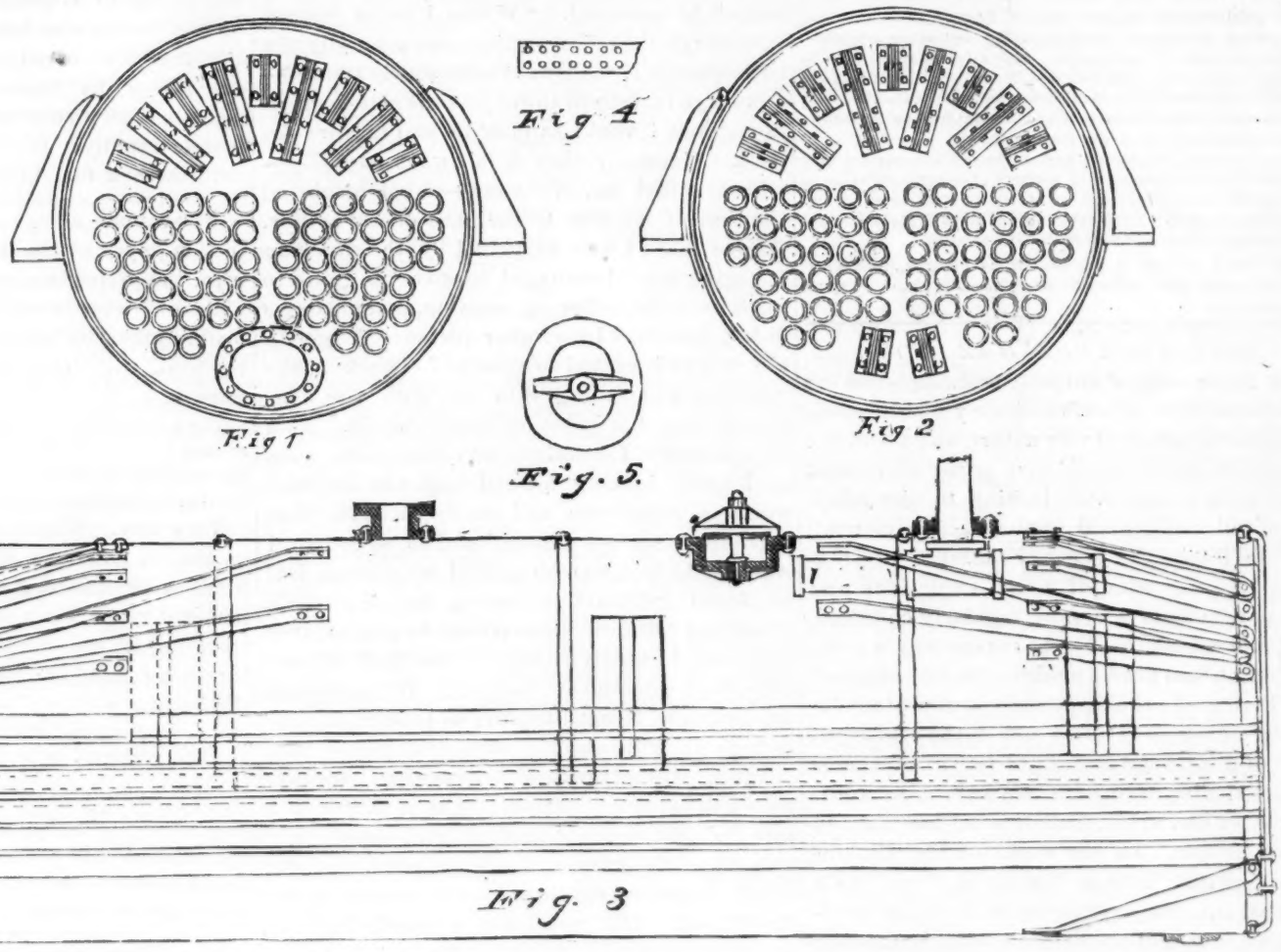
A New Form of Boiler.

A steel boiler somewhat novel for this country is herewith illustrated from the original drawings furnished the Buckeye Bridge & Boiler Works, of this city, by the Otis Iron & Steel Co., who have lately put six of them into their works. The boiler is 21 feet 6 inches long over all, by 6 feet in diameter. It has 60 4-inch tubes each 21 feet long. The material is $\frac{3}{8}$ inch Otis steel. It has 6 heavy cast iron brackets on the sides braced by 3x$\frac{1}{2}$-inch steel braces fastened to steel flange plates by $\frac{7}{8}$-inch bolts. Its two peculiarities are:

1. The bottom, which is composed of one sheet 96 inches wide by 21 feet 6 inches long, joined to the top by horizontal seams running the entire length of the boiler on either side.

2. The joints, which are butted, instead of lapped, being held together by 5x$\frac{3}{8}$ inch strips, one on inside and one on outside, held by 11-16-inch rivets.

The top of the boiler is composed of four sheets, running vertically. There is a manhole in the bottom and another in top. Besides the six manufactured for the Otis Iron & Steel Co., two have also been furnished California parties, and we believe the Arnoux Electric Lighting Co., of this city, also has one in use. Whether this form will secure the greatest strength is a question as yet undecided, though it is to some extent English practice.



A NEW FORM OF BOILER.

Fine Wire-drawing.

Platinum wire has been drawn so fine by Mr. H. F. Read, of Brooklyn, as to be invisible to the naked eye, although its presence upon a perfectly white card could be detected by the touch and could be seen with the aid of a small magnifying glass when the card was held in such a position that the wire cast a shadow. A number 18 platinum wire was placed in a tightly fitting, thin cylinder of silver and drawn through until the cylinder "lost its grip:" the platinum was then drawn through another and another cylinder in same manner, until the apove fineness was acquired, and the silver was reduced to merely a coating. The wire was to be for cross wires in telescopes which require no strength.

THE IRON TRADE REVIEW reaches one of the most prosperous industrial districts in the world.

Talking Cut-off Engine to the Wrong Man.

Miller & Manufacturer.

"Yes, it has been for many years admitted by competent engineers that a great saving of fuel is made by the Automatic Cut-off Engine."

"Vell, how you make dot ouet?"

"Just this way, to make the matter plain, suppose you have a cylinder as big as a barrel, then with the ordinary slide valve gear, at every revolution of the engine it takes the barrel nearly twice full of steam, when you are cutting off, say, at five eighths or three quarters of the stroke, but with the cut off engine where the steam would be used only on an average about one fifth of the stroke, you save about a barrel of steam at every revolution which means a large saving in fuel."

"You a poor argament make. Supposen I a leedle steam barrel get yoost haf so beeg. Then I let him the steam use so much he want."

"O, well, well, but you must remember that the automatic engine accommodates itself to the load, hence if little power is required little steam is used, and if greater power is required more steam is used. Whereas, even if you had a smaller barrel you would be using practically the same amount of steam all the time whether you had on a full load or only half a load Don't you see?"

"Vell I all the time keeps him loaded up, I no time haf to gif him a leedle load, too much busy, and veat is high und flour is low."

"But then look at your regulation. An engine using wire drawn steam through an ordinary governor cannot run as steadily an an automatic engine with the throttle wide open and taking steam almost equal to boiler pressure at the beginning of every stroke. Regulation is very important to millers, you know."

"Yes, my Toctor, he told me dot but you see dem eengin no regilation need. He go right along all day und night times too ven we run em, ve always drottle him vide open, ve doant haf to cut him off mit your audomadicks."

"I'll tell you what I'll do; When I get home I will send you some pamphlets of engine tests made by Ed. Reynolds, Ike Holmes, and John Hill, then you will understand it better."

"Vell you send em, I dest em."

"Drop in and see us when you come up."

"All right I get some belt hook, and a gubble mill bicks,—So long."

(Cut off missionary outside.)

Whoop-la! he's a holy terror.

A Cheap Work-hop Disinfectant.

Engineer & Iron Trade Advertiser, Glasgow.

In workshops, factories, and places generally where numbers of people are congregated together, the removal of foul smells and evil odors is often not only a matter affecting the comfort of a great many persons, but is frequently of the utmost importnace on sanitary grounds. The knowledge, therefore, of how to obtain a cheap disinfectant at a trifling cost, we think may prove of service to a great many of our readers, and cannot in fact, be too widely spread. Many solutions of metallic chlorides are useful for this purpose, owing to their ready decomposition, and without being open to the same objection as the so called "chloride of lime" so generally used, the smell from which, however, is to many people as offensive, or even more so, than the smell it is intended to destroy. Dr. Goolden, of St. Thomas's Hospital, first brought into notice, we believe, a solution of chloride of lead, as being inodorus, more effective, and procurable at almost infinitesimal cost. Purchased in the form of chloride of lead, it would cost about two shillings per pound, but it may readily be obtained from the nitrate of lead (which may be purchased at a sixpence per pound) and common salt as follows:—Take half a drachm of nitrate of lead, dissolved in a pint or more of boiling water, and dissolve two drachms of common salt in a pail or bucket of water. Pour the two solutions together, and allow the sediment to subside. The clear supernatant fluid will be a saturated solution of chloride of lead. "If the general public," says Dr. Stone, F. R. C. S., in a letter to a contemporary, "would have their areas and dust-bins disinfected with the above solution, it would conduce materially to the health and comfort of the community at large. A cloth dipped in a solution of chloride of lead, and hung up in a room will sweeten a fœtid atmosphere instantly, or the solution thrown down a sink, water-closet, or drain, or over a heap of refuse, will produce a like result.

A LARGE works for the manufacture of linseed oil, under the "new process," is being built at Leavenworth, Kansas. It will be called the Central Linseed Oil Co. Its officers are President, J. M. Williamson, of Kansas City, Secretary and Treasurer, A. L. Crawford, New Castle. J. E. Crawford, of New Castle is Superintendent.—[New Castle (Pa.) Guardian.

IRON TRADE REVIEW
AN WESTERN MACHINIST

ESTABLISHED 1868 —SEVENTEENTH YEAR.

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To Machinists, Manufacturers and Others.

THE publishers of the IRON TRADE REVIEW solicit items of information concerning manufacturing and other establishments in any part of the country, and all such items will be promptly inserted in these columns, free of charge. Facts are the only things needed; and all communications should be accompanied with the name of the contributor—not for publication—but as a guarantee of good faith.

Manufacturers, machinists and engineers are particularly requested to communicate any matters of interest relating to their specialties. No one need be deterred from sending any interesting facts in his own language, as all such contributions will be properly revised before sending to press.

☞ When writing to any of our advertisers, please say that you saw their advertisement in the IRON TRADE REVIEW

IRON-WORKERS' HAZARDS.

We recur to this subject, first, because no systematic effort appears to have yet been made to collect statistics of this nature, and secondly, because it seems to us that some movement ought to be inaugurated looking to the adoption of rules of general application which shall tend to lessen the peculiar hazards of iron-workers. Statistics of boiler explosions and railway accidents are now regularly collected, and there seems to be no reason why a similar effort should not be made in the line suggested. Perhaps in the appointment of a State Inspector of Shops in Ohio and in the establishment of a National Bureau of Labor Statistics we have the beginnings of this important work.

Since we last wrote, molten metal has claimed several victims. In the works of the Cincinnati & Newport Iron & Pipe Co. a huge ladle of melted iron was overturned while being hoisted by a crane, and the fiery element, scattering in all directions, killed and badly burned three men. At the Cleveland Rolling Mill Co.'s Bessemer Steel Works, a pit man was terribly burned by one of the ingot molds overflowing. A more singular explosion of molten metal took place in the South Boston Iron Works. One hundred and twenty tons of melted iron had been run into the mold of a huge gun—the largest ever made in this country—when a sudden explosion took place, forcing the molten mass 60 feet into the air. Fortunately the men fled in time to escape, but the pecuniary damage was $30,000. In rolling mills, we note the severe burning of a muck roller in the Jefferson Iron Works, Steubenville, O., by a sudden flash of fire in his face, and the instant death of an employe in the wire mills of the 18th Ward, this city, by being caught around the body by a coil of red-hot wire. Among machinists, we have to record the severe laceration of the arm of a helper in the shops of the Webster, Camp & Lane Machine Co., Akron, by being caught in the cogs of a milling machine, and the driving of a piece of iron weighing 14 pounds entirely through the body of an employe in the shingle mill of Wipf Bros., Iola, Wis., by the giving way of some portion of the machinery. Of boiler explosions there have been several, but into that branch of the subject we need not enter.

INVESTIGATE!

A friend of ours, a foundry foreman whose writings have won for him a repuation even beyond the seas, one day conceived the idea that he wanted to learn more than he knew concerning foundry practice in this country. He was not one of those Sir Oracles who assume that all knowledge of the trade is stored up under their respective hats, and that what can be learned outside their shops isn't worth learning. He knew well enough that the only way to study American foundry practice was to visit some of the leading American foundries. So he secured a leave of absence and started out. "How did you manage to get into these large works?" we asked. "Oh, in many ways," he answered. "Where I could not get in through the office—which, was generally the case, though I was always courteously treated—I managed somehow to get past the gate-keepers. Sometimes I would saunter in and inquire for work. Generally they didn't want any help—which suited me, of course—and I employed the time of my stay to the best of my ability. At one place I was surprised by the foreman engaging me. I managed to stave off going to work until the following morning, and of course didn't return. In another instance, I got to the works I wanted to visit at 7 o'clock in the morning, and, falling into line with the men, got through the gates without trouble. As a rule, however, I couldn't stay long. As soon as I began looking around any, the foreman would approach me and gently intimate that 'visitors were not allowed' and so, of course, I went." In this way he picked up a great deal of useful information during his Summer's jaunt and returned home poorer in pocket, it is true, but decidedly richer in practical knowledge than when he started out. We commend his example, if not literally, at least in principle, to all wide-awake, intelligent young mechanics. He was bound to investigate, no matter what personal inconvenience it might put him to. He was not content with simply his own shop experience, nor even with the aid which he got by reading; but he wanted to see for himself. The result was a broadening out of views, the accumulation of fresh ideas and a Summer's experience worth many times what an ordinary "knock-off" or a fishing excursion would have brought him. We conclude, then, as we began: Investigate!

THE COMING FUEL.

It is difficult to resist the temptation of writing somewhat too frequently upon the natural gas developments around Pittsburgh. Judging from the Pittsburgh papers, this subject leads all others, political, social or religous, in that city. Out of it all, we extract two or three recent facts of importance to manufacturers:

1. The known belt is gradually widening. Within the past week new wells of considerable magnitude have been struck at Washington and Hulton, Pa.; Ohio reports two or three paying wells, and now Dakota comes to the front with a rich strike at Frankfort. Already over 100 wells have been sunk around Pittsburgh, many of them of course dry.

2. It has just been discovered that the new fuel in Pittsburgh iron works solves one of the mooted questions of long standing between the rolling mill companies and the river men, namely: the encroachments of the cinder beds upon the river channel. Natural gas affording complete combustion, the growth of cinder beds will cease, and the river men will be saved at least one great source of anxiety.

3. There is danger that, after all, this may not prove the extremely cheap fuel that manufacturers so eagerly desire. To be sure, one firm owning a well calculates its saving, by the use of natural gas, at $30,000 to $50,000 per year, and others figure it out proportionately, but if the proposed consolidation of all the natural gas interests into one great corporation—negotiations for which are reported in progress—is effected, manufacturers can bid farewell to the prospects of cheap fuel.

Meanwhile the coal men are looking askance at the new disturber in the market. Said one of the leading coal men of the Mahoning Valley to the writer, the past week: "If this new fuel proves to be general and permanent, it will be bad for the coal trade. My idea is, however, that it will ultimately exhaust itself. Did you ever notice that these new fangled ideas that come in with a rush and a boom, always go out just as rapidly? It will be exactly that way with the new fuel, in my judgment."

REGARDING a "novel canal boat" mentioned in this paper as the invention of a Cleveland man, the propelling power of which was furnished by a screw, so geared that it could be made to turn by horses traveling in a circle on the boat, the *Mechanical Engineer* arises to remark:

The horse will do more work straight ahead, on fewer oats, in front of the boat, than he will by dividing his strength traveling in a circle and wasting it in friction by turning a screw.

Very true. Which reminds us of a ferry boat on the St. Lawrence River, plying, we believe, between Ogdensburg and Prescott, the motive power of which was a philosophical-looking mule traveling up the steep incline of an ordinary threshing machine horse-power. So long as the necessary "fuel," *i. e.*, corn, was supplied, the aged donkey did his work well; but one day the fodder not being forthcoming, the "motor" suddenly refused to work, and the boat drifted ingloriously on to the shore. A regulation boiler and engine now take his place, to the manifest advantage of the boat, both in safety and economy.

THE telegraph is a great convenience to manufacturers but occasionally it leaves them in the lurch. Recently the Standard Rivet Co., of this city, lost a 40-ton contract by the simple failure of the telegraph company to deliver a message. The Pittsburgh Bridge Co., it appears, went into the market for 40 tons of rivets. The Cleveland company wanted to bid but telegraphed asking a two days' delay. Meantime they mailed a bid that would have taken the contract but for the fact that the telegram was never received by the Pittsburgh parties. The consequence was that, being in a hurry and not being advised of the proposed Cleveland bid, they let the contract to other parties at higher figures; thus both sides were "out." We understand the telegraph company is to be held to account for its negligence.

ALL honor to Bay City, Mich. Its progressive City Council has lately passed an ordinance creating the office of Boiler Inspector and requiring every person using steam boilers to employ competent persons to take charge of the same. Perhaps the need of such municipal regulation can be no better shown than by the

act that one man was found by the newly appointed Boiler Inspector who was unable to name the figures on the steam gauge. This is a reform that ought to grow.

WHAT is the best drink for rolling mill employes during hot weather? Whisky, beer, buttermilk, ice water and other forms of liquid refreshment have their respective advocates, but most experienced and reliable men discard all these and assert that pump water and oat meal is the best by long odds. Drinking frequently and in small quantities is the safest and most satisfactory way of quenching thirst.

"WE firmly believe," says the *American Journal of Railway Appliances*, "that the twenty-four hour system is bound, sooner or later, to obtain." We doubt it. Already the Cleveland, Akron & Columbus Railroad, which introduced the practice, has abandoned it in its public time cards. For our part, we are glad to see so inconvenient a system abandoned.

We second the *Scientific American's* motion for a Dictionary of Shop Terms. Who will be the lucky man to begin the work?

MECHANICAL NOTES.

TEMPERING STEEL IN LEAD.—Red hot lead is an excellent thing in which to heat a long plate of steel that requires softening or tempering on one edge.

ROUTINE.—Beware of the dangers of routine. Nothing so dulls the mind and stifles the ambition as this. A habit of accurate work is necessary; but, though a faithful servant, habit is a bad master. If you find yourself falling into mere routine in your shop work, bestir yourself and study some new way of doing your daily task. It will sharpen your wits and insure you against discontent. Try it.

WRITING FOR THE PAPERS.—No young machinist, foundryman or draught man should settle down to the idea that he can't write for his technical paper. He can, if he only will. Watch your work. Jot down ideas as they come to you. Compare notes. Tackle problems in your work. Write out your thoughts, and allow the editor to put them in shape. This last is the easiest part of it and need not worry you in the least.

ELECTRICAL TRANSMISSION OF POWER.—One of the most remarkable instances of the transmission of power by electricity is that presented by the electric railroad in one of the main crosscuts of the Oppel colliery, Saxony. This crosscut is 2,362 fe et long, and is the outlet for the coal mined in the vein, the quantity delivered to it being 600 mine cars per day of 16 hours, each car weighing, loaded, 1,594 pounds. A train of 15 cars is moved at a speed of from seven to ten feet a second, the steam engine at the mouth of the shaft making from 225 to 250 revolutions during the run, lasting from 3½ to 4½ minutes, through the crosscut. When doing this amount of work, the steam engine delevered 11.2 H. P.; or assuming the friction of the engine's gearing to have occasioned a loss of 25 per cent., the power actually transmitted by the electric current to the locomotive was 5.22 H. P. or 46.6 per cent.

LEARNING ENGINEERING.—At last we know what is the matter of the young mechanics of America. They have not sat under the teachings of the learned editor of the Dallas (Tex.) Machine Journal. Recounting, in a recent issue, the essentials of a good engineering education, he says: "You should know the laws of radiation, combustion, evolution, elasticity, volubility, expansion, condensation, evaporation and the many applicable conversions of steam from the original state back to the same; the laws of bodies in motion, storage of power in momentum wheels, centrifugal force, inerted resistance, friction, gravitation," etc. If "evolution," "volubility," "applicable conversions of steam," "momentum wheels," and "inerted resistance" are necessary requirements of a modern engineering education, how many of our leading engineers fall short of perfection! No doubt there will be a rush to Texas to supply this termendous void of intelligence.

PETROLEUM IN IRON MAKING.

ITS FUEL VALUE FOR METALLURGICAL PURPOSES.

Opposing Claims of a Recent Paper Sharply Examined.

BY AMANDA T. JONES.

An article entitled "The Value of Petroleum as a Fuel for Metallurgical Purposes," and contributed to the Engineering and Mining Journal of June 28, by H. M. Howe, M. E., of Boston, Mass., should not be allowed to pass unchallenged. "Attempts to substitute petroleum for coal," the writer declares at the very outset, are "all inevitably destined to fail." Such an assertion should be followed by incontrovertible argument. Let us see whether it is fully sustained by what follows. "The actual calorific power of petroleum," says Mr. Howe, "has been determined by a most eminent, competent and wholly disinterested authority, and there is no need of looking to the statements of interested persons, or of conducting enormously costly experiments to see how it compares with that of coal, since the matter is already one of record.',

Who is this scientific Eminence, this infallible papal authority, who has once and for all time answered so difficult a question? Happily we are not left in ignorance. "At the request of the Emperor Napoleon the Third" (whisht! think of that now!), "the illustrious Henri St. Clair Deville investigated elaborately the calor ific power of petroleum and gave the world his results." Our informant adds: "The results of such tests are entitled to the same kind of confidence as are those of the chemical analyses of a trustworthy chemist."

Are they? Let us see about that. A practical chemist, after analyzing a fragment of coal or a measure of crude petroleum will be able to state what are the component parts of each, with their exact weights, and the number of heat-units that may be produced from them. He it is who gives us the latent calorific values or powers of the two fuels. What their respect ive efficiencies will be, in combustion, he cannot declare.

A scientific experimenter (like M. Deville), after careful tests, may give us his report of the highest efficiency of either fuel which he has been able to obtain. In accepting his results all the conditions under which they were reached, must be taken into account. For example: The form of furnace used, the peculiarties of its ventilation and draught, atmospheric temperatures and disturbances—with any other accident or influence which may have tended to cause variations in rapidity of combustion, or to hinder proper application of generated heat. I therefore resolutely deny that the "illustrious" subject of the nephew of "my uncle," ever did what Mr. Howe asserts. What he really did was to take two locomotive-boilers built for the Paris and Strasbourg Railway [and practically adapted to the consumption of solid, not liquid fuel], fire them up thoroughly with coal first, afterward turn in his oil and steam—thus creating what the original inventor (patent of 1863) called a "fumous body"—and so proceed to take observations. No matter how carefully he conducted his experiments, how accurately he weighed coal, oil and water, how closely he watched his steam-guage and timed the revolutions of his engine-wheel, his results showed neither the "actual calorific power of petroleum" nor its highest possible efficiency. His furnace arrangements were wrong, his method of using liquid fuel was wrong, and his records were anything but conclusive.

Does not the actual efficiency of any fuel in process of combustion depend very largely upon the construction and peculiarties of the furnace which it feeds? Let Mr. Howe himself be our instructor. He says:

"It is true that the efficiency of coal is generally very low, sometimes less than two per cent. of the calorific power of the fuel being utilized. But this low efficiency is only slightly, if at all, due to the form of fuel used, being due to the form of furnace employed."

And again: "While in some kinds of furnaces the efficiency is as low as two per cent. it rises in well-designed Siemans' furnaces to 20 per cent., in cupola furnaces to even 50 per cent., while in iron blast furnaces even 80 per cent. of the heat generated is utilized." Evidently the writer fully understands that the actual calorific power of coal cannot be exhibited in any furnace whatever. He will therefore frankly acknowledge, if as fair minded as I suppose, that even M. Deville's "elaborate investigations" while experimenting with his locomotives, did not decide the actual calorific power of oil.

The respective latent heat values of anthracite coal and petroleum are as 1 to 1.50 according to some authorities, or as 1 to 2 according to others. We will consider them as 1 to 1.50.

M. Deville calculated the respective efficiencies of coal and oil to be, in his furnaces, as 1 to about 1.18, as appears from Mr. Howe's statement. He did not therefore secure as good a comparative combustion or at least as thorough an application of generated heat with oil as with coal.

Yet it is now a demonstrated and fully conceded fact that a much greater proportion of the inherent calorific power of oil can be made efficient than of coal. Who next will be foolish enough to quote M. Henri St. Clair Deville—no matter how deservedly "illustrious"—as infallible authority on the fuel question?

Nevertheless I fully agree with Mr. Howe that there is "no need of enormously costly experiments" in this direction. I have myself spent about five years of close application to this matter, at an average expense for experiments and personal support of $1,000 per year. I had not laborde more than three months before I secured good combustion of the lighter grades of crude petroleum, within a ten-horse boiler: and instead of using 302 gallons to 2,240 lbs, of coal according to Mr. Howe's estimate I used not more than 127 gallons, with the credit of keeping a higher and more steady steam pressure. I have done much better since, in running boilers both small and large. The apparatus which enables me to manage successfully a 20 horse power boiler can be retailed at $25. Appliances for a 100 horse-power boiler, cost about three times as much, and I will undertake to keep a steadier and more efficient fire night and day, for steam generation, than can be kept with coal.

The practicability of my small invention for at least the simpler metallurgical processes is now shown. Its economy is yet to be demonstrated. Can I judge fairly what that economy will be from the results of my experiments with boilers? Certainly not. Let us consider the reasons why:

We will imagine that crude petroleum had been the only available fuel from the first, and that a philosophically correct method of feeding and managing it under combustion had been known. Is it likely that the exact form of boilers now in use, with a smoke-stack of identical size and height, would have been devised to secure the highest possible efficiency of the fuel? But no inventor of an oil-burning method at this late day, with coal and wood nearly every where available for boilers already purchased, can expect to have an expensive series of experiments conducted in order to furnish him with a boiler exactly adapted to his purpose of generating steam with the least possible expenditure of oil. We must take what we have; adapting fire chambers as well as we may to our new fuel; and letting our flames drift where a pre-ordained draught shall please to take them.

But not so with furnaces for metallurgical purposes. They require to be often torn down and rebuilt, and may with no added expense, be modified to suit an oil fire, giving economic results, that could not possibly be obtained without such modification. If I discover that I can make two barrels of oil do the work of a ton of coal when running boilers (which cannot be reconstructed to suit my purpose) am I not fairly justified in supposing that I can truthfully record a better comparative result after a little slightly expensive experimenting with metallurgical furnaces?

I hold these propositions to be incontrovertible, to wit:

1. The commercial values of all fuels depend not upon their latent (or actual) calorific powers, but upon their practical efficiencies.

2. Since even in so simple a matter as feed-

ing coal to the grate-bars different stokers will cause widely different amounts to be consumed in order to secure a given result, evidently the quantity of oil consumed for the same purpose, will largely depend upon method and management in supplying it to the fire-chamber.

3. That form of furnace which will secure the highest possible efficiency of coal consistent with the special process it is designed to carry on, may utterly fail to exhibit the highest possible efficiency of petroleum.

4. It appears that the efficiency of coal in the various known furnaces used for metallurgical purposes, varies from less than 2 to 80 per cent. and that it is even impossible to build two furnaces so exactly alike that, when tended by the same stoker, their respective consumptions of fuel will be absolutely identical. Therefore:

5. The best attainable efficiency of petroleum as fuel can only be shown by the application of the best invented method, to a furnace especially adapted to its use.

As to the probability of petroleum ever competing with coal for metallurgical purposes, I can only give my individual opinion, based upon the results (well testified to by disinterested observers) of my five years' painful labor. Wherever 105 gallons of crude oil (2½ barrels) equals in price one ton of bituminous coal it will save money and labor to use petroleum for steam generation. I speak well within bounds, for I have testimonials to show better results.

If an iron-heating furnace requires 1½ tons of coal to prepare it for work, I will by merely dropping the velvetry, be ready for a charge in 2½ hours from the time of firing after a consumption of but 60 gallons of crude petroleum. That is to say I have done so much already. With a furnace built expressly to favor my method I might do better. What I could do in steady running with a good furnace of old or new style I do not know. A few hundred dollars spent in experimenting would tell.

The only puddling I have done as yet was reported in the columns of this journal at the time. I did the work under great disadvantages. It could be better done (setting all question of economy aside) in the same furnace with better conditions. Still the practicability of my method for puddling was fairly demonstrated.

Let it be understood that I do not claim that more heat-units are producible from oil than the chemist can discover in the laboratory. Here is what I claim:

1. The combustion of oil can be rendered much more nearly perfect than that of coal, so giving a far greater efficiency in proportion to its calorific power.

2. Furnaces (with their fire chambers, necks and smoke-stacks) can, by well considered changes, be so adapted to the peculiarties of the oil fire, as to allow much closer contact of flame and metal than any that can be successfully operated with coal.

3. The best method of burning oil will give the best results if judiciously applied.

4. No method of burning oil can be good that requires "enormously costly experimenting" and calls for expensive and complicated apparatus before it can be made available for actual work.

In view of all these considerations I am justified in believing that with a fair opportunity (which I have never yet had), I can utilize my method of burning crude petroleum for various metallurgical purposes (as heating iron and steel, puddling reducing ore in small furnaces, etc), and can make it economical throughout a very large territory in the United States, the Canadas, Mexico and Russia, if not in the actual vicinity of coal beds, or up to the very vents of the great gas wells. There is a place for crude oil in metallurgical work.

Improved Calipers.

In our illustrations herewith is shown a new and improved form of caliper designed especially to overcome the uneven wear on the nut and thread incident to the opening and closing of the legs, because of which accuracy of adjustment is rendered difficult. The principle of the device is shown in Figs. 1 and 2 applied to a pair of spring calipers and in detail in Figs. 3, 4 and 5. It will be seen that in connection with the screw, pivoted in one leg of the caliper, and passing through the enlarged hole in the other, a washer, 6, having one flat side upon which the nut rests, and a knife-edge, which rests in a corresponding groove, 8, Fig. 6, across one of the legs, is used. It will be readily understood that in opening or closing the legs the washer will tilt on the knife, bearing on the leg in such a way that the face of the nut and the flat face of the washer will always be true one with the other, and that the nut will consequently turn smoothly and evenly in whatever position the legs may be. By using a knurled nut with the washer it enables the operator to adjust the caliper with one hand. The device is patented and applied to both dividers and calipers. J. Stevens & Co., Chicopee Falls, Mass., are the manufacturers.

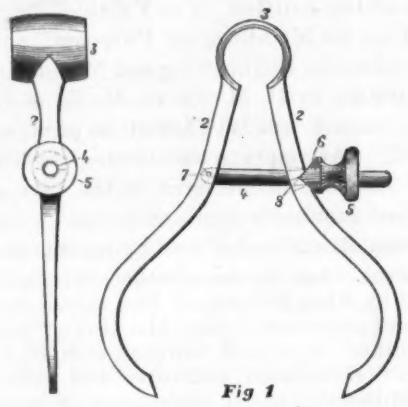


Fig 2

Fig 1

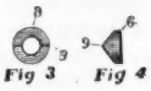


Fig 3 Fig 4

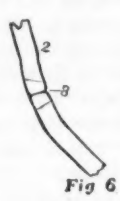
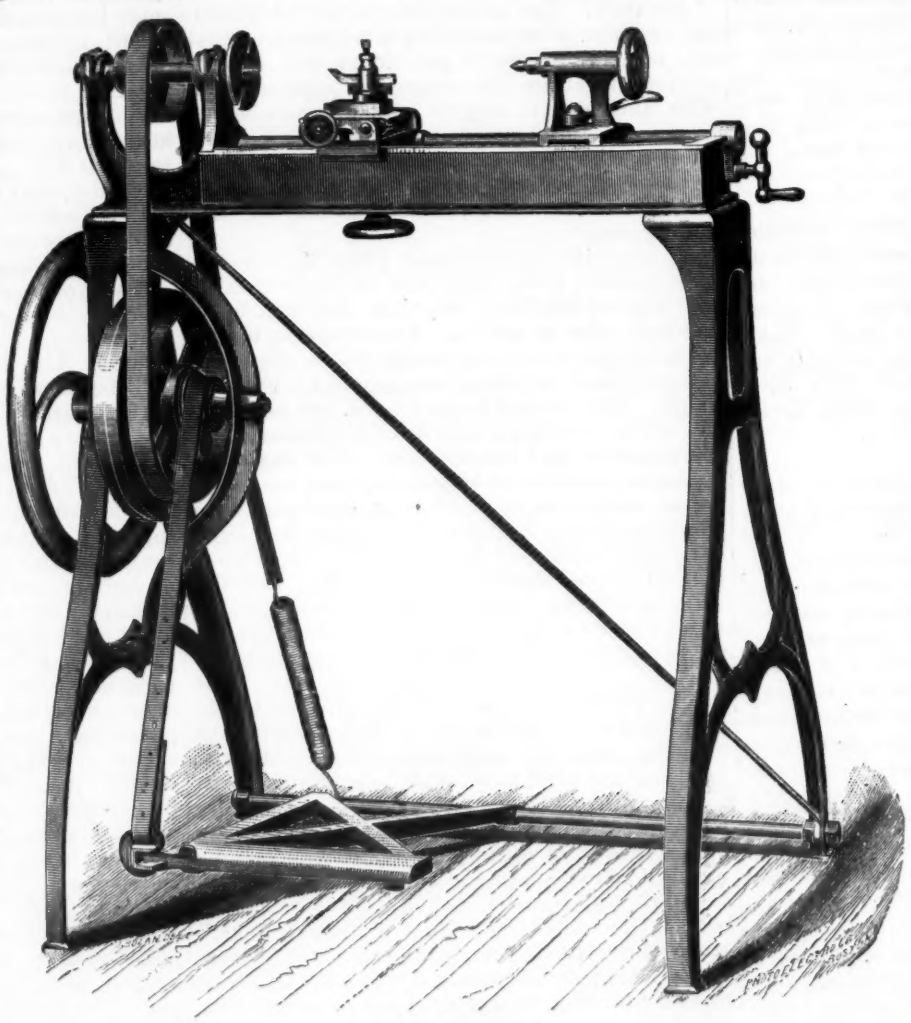


Fig 6



PREMIUM LATHE.

Bearings. Steam Jackets.

Mechanical Engineer.

An English engineer says that no single pair of brasses forming a bearing shouldbe subjected to wear on two or more axes at right angles to each other, and all bearings should be adjustable in the direction in which they wear.

The main bearing of a horizontal engine necessarily has to withstand the alternate thrust and pull of the connecting rod horizontally, and at the same time the load of the fly-wheel and crank-shaft vertically, and possibly the resistance of some driving gear in another direction. This bearing ought, therefore, to be made in four or three pieces, as is usual in good portable engine practice; but in large engines, for the sake of simplicity, it is frequently made with two brasses inclined at an angle of 45 deg., which cannot possibly be kept in perfect adjustment.

The cylinder capacity ratios of compound engines were usually from 3½ to 4 to 1; but if steam jackets were not adopted, it was useless to make the low pressure more than three times the size of the high pressure cylinder, as, if larger, the diagrams would be very attenuated, and almost valueless, in consequence of the lodgement of water, especially at the upper end, Details of some experiments show the slow rate at which an unjacketed, low pressure cylinder is warmed. At one hour and a half after starting, water was present in it during steam admission at a temperature of only 150 deg.; at three hours it was 175 deg.; and only after about five hours did it reach 192 deg.

Our Premium Lathe.

Herewith we illustrate the No. 5 Providence Lathe offered to the person raising the largest club for the WESTERN MACHINIST between now and January 1, 1885. It is manufactured by the Narragansett Machine Co., Providence, R. I. It has a swing over bed of 8 inches; swing over carriage, 4½ inches. The distance between centers is 18 inches; length of bed, three feet. A hollow steel spindle receives rods up to 5-16 inch in diameter. The centers are fitted to Morse tapers. The tail stock sets over for turning tapers. Weight, 175 lbs. It can be furnished with countershaft if desired. The manufacturers' price complete, with slide rest, tool post, two T rests with holder, turned face plate, wrench, etc., is $35.00.

Heating Power of Gases.

Mr. J. T. Duff, engineer of the Consolidated Gas Co. has furished the Pittsburgh Commercial-Gazette with a number of tests of the heating power of different gases. They are as follows:

One cubic foot of carbonic oxide gas will raise the temperature of 2.16 pounds of water from 32 to 212 degrees.

One cubic foot of hydrogen gas will raise the temperature of 2.22 pounds of water from 32 to 212 degrees.

One cubic foot of natural gas will raise the temperature of 6.17 pounds of water from 32 to 212 degrees.

One cubic foot of olifient gas will raise the temperature of 10.74 pounds of water from 32 to 212 degrees.

When illuminating gas is used for raising steam under boilers, twenty feet of gas is equal to one pound of coal.

The Engine Room.

The Force of Steam, and Where it Comes From.

If water be heated it will expand somewhat, and will finally burst forth into vapor. The vapor will expand enormously, and naturally occupy more space than the water from which it is formed. A cubic inch of water will make a cubic foot of steam, that is, the water has been expanded by heat to seventeen hundred times its original bulk. The steam is very elastic; the water was not. When we say that a cubic inch of water will form a cubic foot of steam, we mean that it will do so when the steam is allowed to rise naturally from the water without any confinement. If the steam is confined, as it would be in a boiler, it could not expand, and consequently would not. If the steam is allowed to rise into the atmosphere from an open vessel, the pressure of the steam would be precisely the same as the pressure of the atmosphere, that pressure being about fifteen pounds to the square inch. An ordinary steam gauge only takes notice of the pressure above the atmospheric pressure. When the hand of the steam gauge stands at zero, it indicates that there is no pressure above the ordinary pressure of the atmosphere. An ordinary steam gauge, not connected with anything, has the atmosphere acting upon it in both directions, the same as the atmosphere acts upon everything when it can reach both sides. If the air be pumped out of the steam gauge, the atmosphere will then only act upon one side, and the hand will move backward until it stands at fifteen points less than nothing.

In this condition the steam gauge indicates the absolute zero of pressure. If now the air be allowed to re-enter, where it was pumped out, it will begin to exert its pressure upon the steam gauge, and the hand will move forward, and when the full air pressure is on, the gauge hand will stand at its usual zero.

We go into this matter in order that it may be understood that the real pressure of steam is always fifteen pounds greater than ordinary steam gauges indicate. In all of the finer calculations relating to the action of steam, its total pressure must be known, and this total pressure is to be counted from the absolute zero. The real pressure of steam is always the steam gauge pressure plus fifteen pounds. When steam gauge shows 50 pounds, the steam really has a pressure of 65 pounds. The fifteen pounds of this pressure is nullified by the atmospheric pressure, and the steam gauge shows us our useful pressure.

As before stated, a cubic inch of water will make a cubic foot of steam at atmospheric pressure, that is, fifteen pounds to the square inch, absolute pressure, or zero by the steam gauge. If this cubic inch of water was made into steam in a boiler holding just a cubic foot, the steam gauge would show zero. If the boiler was only large enough to hold half a cubic foot, the steam would all be in the boiler, and being confined in half its natural space, it would have double pressure. It would have an absolute pressure of thirty pounds to the square inch, and the steam gauge would indicate fifteen pounds.

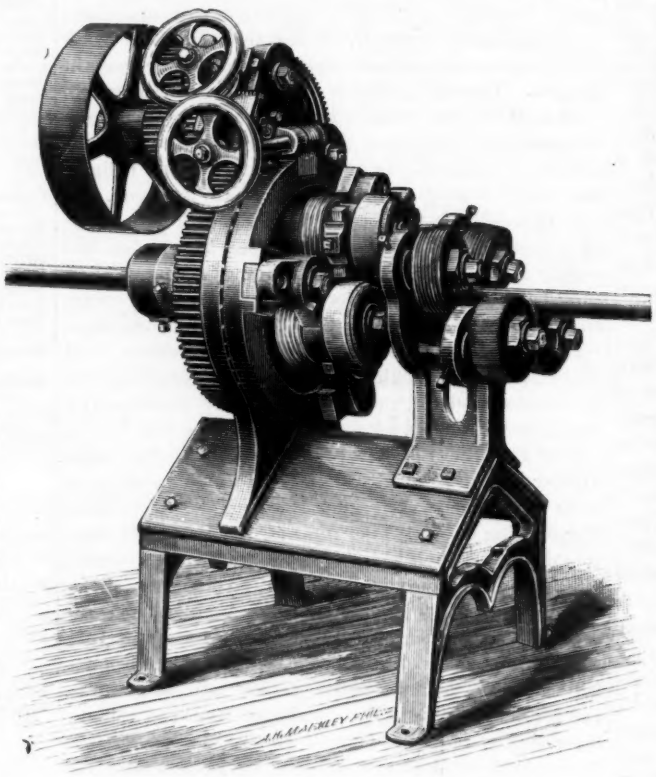
If this steam was then allowed to pass into a chamber holding a cubic foot, the steam would expand till it filled the chamber, and its pressure would go down again to fifteen pounds absolute. In short, the pressure of steam is in reverse proportion to the amount of space it occupies. The pressure of steam may be doubled by compressing the steam into one half its former volume, and so on.

After water is turned into steam, the steam may be made hotter, but it is not very much expanded. The pressure of steam is increased by forcing more steam into the space occupied. If a boiler contains steam at fifty pounds pressure, we may increase the pressure by adding more steam, and thus compressing all the steam which the boiler contains. In the ordinary operation of a steam boiler the fire turns the water into steam, and the more steam there is made and confined the greater the pressure will be. If the steam is constantly flowing out of the boiler into an engine, the pressure in the boiler must be kept up by continually making new steam to take the place of that drawn off. If we make steam as fast as it is drawn off, and no faster, the pressure will remain the same. If we make steam faster than the engine draws it off, the pressure will rise, and if it is drawn off faster than we can make it, the pressure will go down.

The pressure of steam is due to its desire to expand into a larger body, and it acts outwardly in every direction against everything upon which it presses. If we crowd six hundred cubic feet of steam into a boiler which will only hold one hundred cubic feet, the steam will be held compressed into one sixth its natural bulk, and will thus have a pressure of ninety pounds, and the steam gauge will show seventy five pounds. If a hole one inch square be cut in the boiler, and a weight of seventy-five pounds laid over the hole, the steam will just lift this weight. If the atmospheric pressure could be removed from one square inch of the top of the weight, the steam would then be capable of lifting a ninety pound weight.

The force which this steam will exert to lift a weight, or any similar thing, against which it acts, will equal the pressure per square inch multiplied by the number of square inches which the steam acts upon. It will thus be readily understood that if we lead a pipe from the boiler, and fit a piston in the pipe, the steam will tend to force the piston out of the pipe.

The steam engine is nothing in the world but an enlargement upon the end of the steam pipe, containing a piston, against which the steam in the boiler may press. The piston moves a certain distance, and then the steam is allowed to press upon its other side, while the steam on the first side is allowed to flow into the atmosphere and go to waste.



PATENT FLUE CLEANING MACHINE.

Serious if True.

The Insurance Critic asserts that there are more than 10,000 steam boilers in New York city, attended by 7,000 men, of whom not one-seventh are believed to be trustworthy and qualified for their responsible work; and yet dynamite cartridges are a terror to many people.

THE perpetual clock, which has been running in Brussels a year without stopping or being touched by human hands, is wound up by a draft of air through a tube which operates on a fan connected with the machinery. The draft is made to pass upward through the tube by exposing it to the heat of the atmosphere.

Otto's Patent Flue Cleaning Machine.

The machine represented in accompanying cut is designed for removing the hard adhering crust of lime from boiler flues, which is very difficult to remove in a cleaning roller or tumbler, and expensive also, because of the waste of steam and time. Very little power is required to run the machine. It is operated by a laborer, who enters the flues in the machine (one at a time), they being revolved and fed through, like a screw, and dropping off on the opposite end without assistance. It will clean from two to six feet per minute, removing all scale and without injury to the flue. It takes up very little room, is almost noiseless, and makes but little dust.

It is so constructed that no countershaft is needed. It is provided with a double clutch gear, which enables it to be reversed in case of special need, and sets the pulley free, to avoid countershaft. To set the machine is only necessary to place it in line with pulley on shaft that power is taken from.

Three revolving shafts, provided with circular blunt edged steel cutters, are set obliquely in adjustable boxes, the central line of the flue passing between them; these boxes are connected with a movable ring, governed by a worm screw, which is operated by the lower hand wheel, and each of them is provided with a small adjustable circular assisting cutter with cross teeth, which cuts the lime lengthway; after being cut crossways by the circular cutting plates on revolving shafts, the scale is consequently reduced to squar eparticles in a rough manner. The same process is repeated by four circular finishing cutter revolved by the flue, two of them being provided with length teeth and two with cross teeth, and placed adjustable on the same incline plane to the extending plate. Having the circular cutters on the revolving shafts on the same incline plane, the first and second cutters on each shaft will not come in contact with the flue, but will afford an easy entrance, acting like a mill, preventing the machine from choking. There is no sticking, as the cutters are all revolving. To overcome oval places, or uneven diameters, the cutters are arranged to give a little, and when passed, immediately come back to their original position and by a slight movement of top hand wheel, the machine can be reversed (or stopped) and the bad place cleaned by passing back and through again. Many flues are not perfectly straight, but as any part of them within the machine is held central in line, the projecting ends are at liberty to swing.

The entrance tube is provided with a set of collars with different sized holes to be inserted alternately, to suit the different diameters of flues which should be entered in a straight line to prevent cutters from being broken.

This machine is strong in all its parts, and will stand the hard work it is designed to do. The shafts are protected from dirt and dust with bronze bushings, that can be replaced; the cutters are of best tool steel, and are made in duplicates, which can be furnished when desired. The platform of frame is shaped like a saddle to allow the loose lime to fall off freely. The speed of the machine is optional with user. The pulley can be run as high as 400 revolutions per minute, when about six feet per minute will be cleaned.

The manufacturers, the L. B. Flanders Machine Works, 1825 Hamphill, Philadelphia, Pa., will furnish circulars, price lists, etc.

Smoke Consumer.

The following simple method for the consumption of smoke is given by a German exchange: Start the fire as usual and let it burn until the coals are in a bright glow; then rake the coals on the grate to the right and left, so as to form an empty space along the middle, and put the fresh coals ino this space. The smoke which is formed from the fresh coals is consumed by the glowing fires on either side. If the grate is very wide, two such open spaces in the fire are advantageous for the addition of fresh coal.

* From Catalogue of Hooven, Owens & Rentschler Co., Hamilton, O.

Market Review.

OFFICE OF IRON TRADE REVIEW.
CLEVELAND, FRIDAY EVENING, July 25, 1884.

IRON ORE.—So far as local business is concerned, but little has been doing the past week. There are few buyers in the market, and inquiries are not numerous. Meanwhile the steady shipment of ore from Lake Superior continues, and the lower lake docks are filling up so rapidly that the railroad companies are beginning to give notice to furnacemen that they must move their stocks. Most of the ore now coming in is already sold and must be paid for in regular installments, according to contract, but purchasers are loth to receive it for the reason that their furnaces are generally out of blast and that their facilities for stocking it up are limited. As indicative of the way in which ore is accumulating on the docks, it appears that whereas the receipts for the past week have been 1,308 tons in excess of the corresponding week of last year, the shipments for the week were only half what they were the same week of 1883. The docks have seldom been loaded as heavily as at present. With the exception of those occupied by the Republic Iron Co., which have still some room left, there is very little space unoccupied. Receipts for the week ending July 23 were 36,054 tons; shipments, 10,982 tons, as against receipts of 36,379 tons and shipments of 8,267 tons last week. Lake freights rule steady, 90 cents from Escanaba and $1.10 from Marquette being the usually quoted figures. We quote:

No. 1 Specular and magnetic Bessemer Ores per ton	$5.50@ 6.50
No. 1 Specular (non-Bessemer) ores per ton	5.00@ 5.50
Bessemer Hematites	4.75@ 5.00
Non Bessemer Hematites	4.25@ 4.75
Menominee Range Bessemer	5.15@ 6.00
Menominee Range non-Bessemer	4.00@ 4.70

PIG IRON.—Transactions have been few, far between, and of no moment the past week. There is a general feeling that prices cannot go lower, and a speculative feeling exists in consequence, to some extent. A Pittsburgh gentlemen stated the past week that if he had $1,000,000 at command, he would put it all into pig iron at present prices, firmly believing that an early rise would secure him a handsome profit. Stocks are generally low, and should any considerable demand spring up, the resumption of a large number of furnaces would be the necessary result. Such a revival, indeed, is already being talked of with some degree of confidence. The political situation is not such at present as to seriously disturb business, and there seems to be very little in the way of a resumption of demand. Meanwhile prices rule very low, a gentleman just returned from Pittsburgh stating that good neutral mill irons can be bought in that city at from $15.50 to $16. An offer equivalent to $15.50 f. o. b. at Cleveland for similar irons was, however refused at the furnace.

Last week we published an approximate statement of the condition of furnaces supplied with Lake Superior ores from Lake Erie ports. This week we republish the table, with additions, as verified the past week by Mr. H. A. Tuttle, of Tuttle, Oglebay & Co., who vouches for it as absolutely correct at the present time:

LOCATION OF FURNACES.	In.	Out.	Total.
Buffalo,	1	0	1
Shenango Valley,	6	16	22
Pittsburgh,	8	9	17
Fayette County,	1	4	5
Cambria,	5	2	7
Wheeling and vicinity,	0	8	8
Mahoning Valley,	5	13	18
Hocking Valley,	0	13	13
Columbus,	1	0	1
Zanesville,	1	0	1
Leetonia,	1	3	4
Cleveland,	3	3	6
Massillon and Canal Dover,	1	1	2
Total,	33	72	105

This shows over 67 per cent. of these furnaces out of blast.

We quote, nominally, as follows:

CHARCOAL PIG IRON.

No. 1 Lake Superior charcoal	$22 00@22.50
No. 2 Lake Superior charcoal	22.00@22.50
Nos. 3 and 4 Lake Superior	21 50@22.50
Nos. 5 and 6 Lake Superior	21.50@23.50
Nos. 1. 2, 3, 4, 5, Salisbury	34.50@36.00
Southern Car Wheel	25.00@28.00

BITUMINOUS AND COKE IRON.

No. 1 foundry, all lake ores	$18.50@19.50
No. 2 same	17.50@18.50
No. 1 foundry, lake ores, with cinder mixture	17.00@18.00
No. 2 same	16.50@17.50
No. 1 foundry, native Ohio ores	19.25@20.25
No. 2 same.	17.00@18.00
No. 1 silvery, native Ohio ores	18.50@19 50
No. 2 same	16.00@17.00
No. 1 gray forge, red short	16.00@17.00
No 1 gray forge, neutral	16.00@17.00
No. 1 Bessemer	19.00@20.00

MANUFACTURED IRON.—The market is quiet but steady. A gentleman from the Mahoning Valley informs us that business is picking up to some extent. Some of the mills are running full time, and others, which were expecting to close down last week for want of business, have found that orders have again commenced to come in to such extent as to promise a steady run for some time. Stocks of manufactured iron are reported generally small, and the outlook for better business next month is thought to be quite encouraging.

WROUGHT PIPE.—The Empire Iron Co., which controls the wrought pipe market, is holding a special meeting in New York to-day, and it is anticipated that some changes will be made. Trade in fixtures and tools is quiet, but lower prices are not looked for.

STEEL RAILS.—This week's Iron Age says: The market is in a very unsettled condition, owing to recent transactions which are supposed to have netted less than $29 at mill. Reports are current that one of the Texas railways has an order for 10,000 tons at less than $30, delivered at Jersey City, so that $30 at mill is now quoted for ordinary lots, and from that down to $29, according to size of orders. The market is very unsettled, although it seems impossible for prices to go any lower, although there are free sellers at the rates above quoted.

SCRAP IRON.—No change from last week is to be noted, but dealers look for some improvement after the first of next month.

HARDWARE.—Trade has been quiet the past week. Compared with the usual July trade. it is, if anything, much slower than last year. Collections continue slow. Among country dealers there is anticipation of a good Fall business, and jobbers expect a much better trade in August. The nail market is weak, with small demand.

MACHINERY OILS.—The demand for mineral oils is somewhat better than at last report, but no better prices are obtained. In animal oils the demand is light, the supply is good, and the prices remain the same.

COAL.—Trade is exceedingly quiet, with no change in prices. Lake shipments continue heavy, but the supply is ample. The strike in the Hocking Valley mines makes shipments more lively at the other mines in Ohio. This week's Coal Trade Journal says: "There is to be a regular meeting of the Western Coal Association on the 29th instant, and considerable anxiety exists as to their course of action. It is claimed by some parties that an advance is likely to be had."

COKE.—The Pittsburgh Chronicle Telegraph says: During the past month the total shipments of coke from the Connellsville region decreased over 1,200 cars. The blowing out of 25 per cent. of the ovens and shutting down the whole number two days in each week, still leaves the supply in excess of the demand, a depression accounted for by the closing of mills, etc., for repairs. The ovens will be run until the end of July without further restriction, but if trade does not promise better by that date, the entire region will be given a rest for a few weeks. The syndicate has been able to maintain the price throughout the recent depression. Operators fancy business will look up toward the close of the present month.

CINCINNATI PIG IRON MARKET.

[Reported for IRON TRADE REVIEW by E. L. Harper & Co.]

There has been no marked change in the market since our last report. Supply has been somewhat in advance of demand on account of the usual Midsummer stoppage af the rolling mills for repairs and the comparatively limited Summer work of the foundries. General business has been but moderate for 60 days past, and hence the consumption of crude iron has been abridged and the usual July renewals of contracts for pig iron postponed by some until August. An extraordinarily bountiful harvest is assured, which gives promise of ease and prosperity to the farmers, who have taken up from the manufacturers of the best agricultural implements about all the machines they had for sale. The financial "squeeze," has demonstrated that the general trade is on a solid basis, and indications favor a good average Fall business, in spite of the exciting political campaign before the people. The 425 blast furnaces quiet, leaves the number operating only 278, so that there can be no excessive accumulation of iron, and prices, it may be expected, will be better as the Fall approaches with an improved business. The local conflict between the stove manufacturers and the Molders' Union continues. The surrender of one of the manufacturers, yesterday, in no way affects the others, who are running and will run their foundries independent. Inquiries for prices on crude and manufactured iron are increasing, and the market closes with a cheerful spirit. We quote as prices current (July 21):

FOUNDRY.—Hanging Rock Charcoal, No. 1, $21 00@$22 50; Hanging Rock Charcoal, No. 2, $20 00@$21 50; Strong Neutral Coke, No. 1, $17 75@$18 25; Strong Neutral Coke, No. 2, $17 00@$17 50; American Scotch, No. 1, $18 00@$18 50. GREY FORGE.—Neutral Coke, $16 00@$16 50. Cold Short, $15 50@$16 00; CAR WHEEL AND MALLEABLE—Hanging Rock, Strictly Cold Blast, $26 00@26 50; Hanging Rock Warm Blast, $22 50@$23 50; Lake Superior, Charcoal all grades $23 50@24 50; Southern Car Wheel Strictly Cold Blast, $26 00@$26 50; Amherst Virginia Warm Blast, $21 25@$21 75; 4 mos.

Reported for IRON TRADE REVIEW by Rogers, Brown & Co.

The week has passed without incident. Business continues quiet, the little buying being almost entirely for immediate consumption. The contracts taken earlier in the year for regular deliveries have mostly expired, so that the demand at present represents very nearly the actual consumption. We quote for cash f. o. b. Cincinnati (July 21):

Hot Blast Foundry.—Hanging Rock Charcoal, No. 1, $21 00@$23 00; Hanging Rock Charcoal, No. 2, $19 00@21 00; Southern Charcoal, No. 1, $19 50@20 00; Strong Coke, No. 1, $17 75@18 00; Strong Coke, No. 2, $16 50@$17 25; Strong Coke No. 3, $16 00@$16 75; Soft Stone Coal, No. 1, $18 50@$19 25; Soft Stone Coal, No. 2, $17 00@$17 75. Forge—Strong Neutral No. 1, mill 15 00@$15 50; Cold Short No 1 mill, $14 50@$15 00. Car Wheel Malleable—Hanging Rock Cold Blast $31 00@$31 00; Hanging Rock Warm Blast $20 00@$24 00; Southern Car Wheel Iron $24 50@$26 00; Lake Superior Car Wheel Iron, $23 00@24 50; Lake Superior Malleable Iron, $24 50@$25 5..

LOUISVILLE PIG IRON MARKET.

Reported for the IRON TRADE REVIEW by Geo. H. Hull & Co.

The market is quiet and dull. Sales are light, and generally at inside figures. Furnaces generally are holding irons for future delivery about half a dollar a ton higher than our quotations, which are for cash in round lots (July 23):

PIG IRON.—Southern Coke No. 1, Foundry, $17.50@$18.00; Southern Coke No. 2, Foundry, $16.00@16.50; Hanging Rock Coke, No. 1, Foundry, $18.00@$18 50; Hanging Rock Charcoal, No. 1, Foundry, $22.00@$23.00; Southern Charcoal, No. 1, Foundry, $18.00@$19 00; Silver Grey, different grades, $15 00@17 00; Southern Coke, No. 1, Mill, Neutral, $15.00@$15.50; Southern Coke, No. 2, Mill, Neutral, $14.00@14.50; Southern Coke, No. 1, Mill, Cold Short, $14.50@$15.00; Southern Charcoal, No. 1, Mill $16.50@$18 00; White and Mottled, different grades, $14.00@$14.00; Southern Car Wheel, Standard Brands, $25.00@$26.50; Southern Car Wheel, Other Brands, $22.00@$24.00; Hanging Rock, Cold Blast, $26.00@$28.00; Hanging Rock, Warm Blast, $21.00@$23.00.

COAL,

WHOLESALE.

Wholesale f.o.b. cars at Cleveland:

Carbon Hill and Monday Creek	$2 50	New Hazelton, mix	1 20
Massillon	2 65	" " nut	2 00
Palmyra, lump	2 75@2 90	Connotton	2 25
Brier Hill	2 75@3 00	Connotton, mix	1 20
Pittsburgh	3 00	" nut	2 00
Salineville	2 25	Anthracite grate	5 04
Tuscarawas	2 25	Anthracite egg	5 13
New Hazelton	2 50	Anthracite stove	5 36
		Anthracite chestnut	5 26

RETAIL.—Delivered.

Massillon Lump	3 65	Palmyra Lump	3 75
" Nut	3 40	New Hazelton	3 50
Carbon Hill and Monday Creek, lump	3 50	Connotton	3 00
Carbon Hill and Monday Creek, nut	3 25	75c less on cars by car load.	
Straitsville, lump	3 40	Anthracite Stove and Chestnut	6 00
Straitsville, nut	3 15	Egg and grate	5 75

OILS.

Pure Oils. p'kages included		Linseed oil, raw	59@62
Sperm, winter bleached per gal	1 25@1 30	do do boiled	62@65
Whale, winter bleached per gal	68@70	Cotton seed oil white	50@55
Straits	40@45	do do yellow	49@54
Bank	38@43	West Virginia lubricating 28 deg	12c@15c
Lard oil extra W S	63@66	Paraffine oil winter pressed	18@25
do No 1 do	53@66	Capitol Cylinder	75
do No 2 do	48@51	Model do	60
Tallow oil	65@68	Eldorado Engine	35
Neatsfoot oil pure	95@$1 00	Turpentine, per gal	38
do No 1	75@80		

LAKE SUPERIOR ORE SHIPMENTS.

Below will be found a statement, tabulated from the Marquette *Mining Journal*, of lake shipments of iron ore from ports of Lake Superior up to, and including, Wednesday, July 16, also for week ending that date:

Port,	For Week.	For Season.
Marquette—Marquette District,	48,105	352,484
L'Anse—Marquette District,	2,441	28,000
Escanaba—Marquette District,	64,402	271,170
" —Menominee District,		457,306
St. Ignace—Marquette District,	4,552	26,316
Total	119,500	1,135,276

Shipments to above date in 1883, 783,227 tons, a gain this year of 351,949 tons.

Leading mines have made shipments up to the date mentioned, as follows:

Chapin	165,247	Cleveland (hem.)	25,275
Republic	119,092	Perkins	19,522
Champion	97,226	Barnum ("A")	19,365
Cleveland	78,705	Angeline (hem.)	19,036
Norway	57,488	Nanaimo	17,399
Lake Superior	49,850	Superior	16,169
Vulcan	47,082	Pitts. & L. Angeline	15,327
Ludington	43,464	Barnum	13,642
Cambria	34,146	Superior (hem.)	12,580
Jackson	32,511	Metropolitan	12,469
Winthrop	28,793	Salisbury	12,289
Iron River	26,196	Michigamme	10,842

THE IRON TRADE REVIEW—an indispensable adjunct in every establishment—$3 a year.

Cleveland Wholesale Prices

[The lowest quotable prices are given in all cases.]

HARDWARE.

Adzes.

Carpenter's.....per doz	$18 40
Ship ..... " "	18 75
Heavy railroad.. " "	19 50

Axes.

	per doz.
James' 2d qual.....	$7 00
Buckeye	7 75
" doub. bitt.....	15 00
Hunt's	9 50
Mami's.....	8 00
Lippincott's Crown.....	8 50
Cut More.....	9 00
Peck's Double Bit.....	22 00
"Champion Blade.....	11 00
Good triple silver steel..	11 50

Axles.

Standard list,....
Nos. 1 to 6, 60 off
Nos. 7 to 14, 60 & 5 off
Nos. 15 to 18, 60 off
Nos. 19 to 22, 60 & 10 off

Anvils.

	per lb.
Eagle, Amer.....10c dis 20	
Wright's.....	10¾c@11c
Armitage's Mouse Hole.....	9¾c@9¾c
Trenton.....	10½c
Wilkinson's.....	10½c

Anvil Vise and Drill.

Millers Falls Co. $18.....dis 20
Cheney Anvil and Vise dis25&2

Augurs and Bits.

C S cut augers .....dis 60
do do do bits..... 60
D C gimlet do Ives.. dis 50
Snells bits ..... dis 60
Russell Jennings' augers, new list dis 25
Cook's pat augur.....40&10

Animal Pokes.

Akron.....$ 3 50
Camp's 4 00
Berea, per doz..... 4 00
Eagle, per doz..... 5 00

Apple Parers.

Domestic & Reading ℔ doz. $7 00
Turn Table..... 4 50

Axle Grease.

Frazier's, per gross,.....$10 00
Common, " 6 00

Bolts.

Carriage com, new list.....75
Tire, common, new list.....65
Eagle carriage bolts 70
Philadel. " " 75
Stove bolts.....50
Plow bolts.....40
Machine 75
Cast iron barrel bolts .. } 55&10
Wr't " " " . } 55&10
Cast iron chain bolts.. 65&10
Wr't iron sq'r bolts.... } 55&10
Wr't shutter bolts ..... } 55&10
Ives' pat. door bolts... 50
Sargent's list
Bolt Ends 16c. per lb. net .. 75
Cast Iron Barrel Shutter, etc .....dis 55&10
Wrought Barrel.....dis 55&10
Wrought Square.....dis 55&10
Wr'g't Shutter, all iron, Stanley's list.....dis 50&10

Bright Wire Goods.

List June 5th, 1883.....70&10

Bellows. Dis

Hill,s.....40 pr cent
Bl'ksmith's com new list,50 ℔ ct
Moulder's new list, dis 25 ℔ ct
Hand, new list, 25 per cent

Butts. Dis

Wr ught brass..... 75
Cast, loose joint.... 60&10
Pin, loose..... 60&10
Wrought, fast joint narrow..... 60
Wrought fast joint broad..... 60
Wrought loose joint broad 60
Wrought table and back haps..... 60
Loose joint, without acorns..... 60
2 per ct. extra dis for cash.

Boiler Tubes.

"National" Standard Gauge 1 inch to 10 inch.....dis 37½
"National" Standard Gauge 11 inch to 15 inch ..... dis 25
"National" Special Locomotive Tubes. ..... net list

BoilerMakers' Tools.

Doty's Power Shears ..net list
" Hand Lever Shears.net list
" Power Punch.....net list
" Hand Punch .....net list
Steel Screw Punch.....net list
Iron Screw Punch ....net list
Boiler Plate Rolls.....net list
Buffalo Forges & Blowers dis 20
Watson's " " net list
Spring Tube Expander ..dis 15
Roller Tube Expander.net list
National Tube Cleaner .dis 20
Wire Flue Brushes ....net list
Anvils—"Peter Wright" 12½ ℔ lb
Solid Box Vises ..... net list

Bag Holders.

Sprengle's Pat, $18.00 per doz 40 per cent. dis.

Charcoal Iron

4½ inch, per doz.....	2 50
5 do do	3 50
6 do do	4 50
7 do do	5 50
Planished Amer. Russia Iron	
4½ inch per doz.....	5 00
5 do do	6 50
6 do do	8 50
do do	9 50

Discount 38½ per cent

Cleveland Stamped Elbows

Genuine Russia Iron

4¼ inch, per doz.....	5 50
5 do do	7 50
6 do do	9 50
7 do do 11	00

Chisels.

Hot and cold cutting...	℔ lb 30
Railroad track	30
Machinists	30
Mallet head	50
Tape	50
Packing	50
Stone cutters	50

Crowbars.

Cast steel	℔ lb 5
Iron, steel points.....	4½

Cutlery, Pocket and Table.

Meriden Cutlery Co., table net
Am. Miller Bros.' Cutlery Co .....dis 25
Humason & Beckley, pocket 33⅓
Naugatuck Cutlery Co. list net
Aaron Berkenshaw's pocket dis 25
Fram Cutlery Co., .. table net
Cleveland Cutlery Co ...dis 25
Miller Bros., pocket..... 33⅓
Akron Cutlery Co.....dis 45

Coopers' Tools.

Bradley's ..... dis15@20
Braton's ..... dis15@20

Chains.

Coil by cask,

3-16	¼	5-16	⅜	7-16	½
9	7½	6 15	560	5 10	495

Drills and Drill Stocks.

Blacksmiths', each. $2.50 dis 10
Blacksmiths', self-feeding, each 7.50 dis 20
Breast, P. S. & W ...dis 20&10

Drawing Knives.

Peck, Stow & Wilcox....dis 70
Witherby's .....dis 65@10
Nobles Mfgr. Co 15
Adjustable handle 20

Emery and Sand Paper.

Regular Numbers ..... ℔ lb 6c
Flour and F. F..... ℔ lb 4c
B. & A. Emery Paper ...dis 35
Sand paper ..... dis 35

Enameled & Tinned Ware.

Kettles.....dis 50
Sauce Pans.....dis 30
Tinned Sauce Pans..... dis 30

Files.

Parkin File Co ..dis 40 ℔ cent
E.M. Boynton's, new list dis 25
J. & Riley Carr .....4.50 to £.
Johnson & Bro. .....dis 50
Butcher's.....4.50 to £.
Walter Spencer & Co.'s "Diamond"..... 4.50 to £.
Western 40
H. Disston & Sons (new list) ..... dis 40 per cent
Heller Bros.' Horse Rasps dis 35
Nicholson..... dis 40
New American..... dis 40
Union File Co ..... dis 40
Dayton File Works 40

Grindstones.

Berea.....1@1¼ ℔ lb
Ohio .....1¼@1⅜ ℔ lb
Nova Scotia.....1¼@1¼ ℔ lb
Lake Huron.....1@1¼ ℔ lb

Hammers.

Maydole's .....dis 15
Cheney's .....new list 20&10
Hartford Hammer Co.....dis 20
Humason & Beckley.....dis 15
Verree.....dis 5
Magnetic Tack, Nos. 1, 2, 3, $1.25, $1.50 and $1.75, dis25&10
Nelson Tool Works..dis 40&10
Warner & Noble's .....dis 5
Kip's.....dis 30

Hatchets.

Buckeye.....Shingling,
Nos..1, 2, 3,
℔ doz $7 50, $8 00, $8 50, dis 40
Claw,
Nos..1, 2, 3,
℔ doz $8 25, $8 75, $9 25, dis 40
Lathing,
Nos.....1, 2, 3,
℔ doz $7 50, $8 00, $8 50, dis 40

Hay Knives.

Lightning.....per doz. net $18
Wadsworth 33⅓

Hinges.

Champion double acting spring hinges .....dis. 30
Screw & Strap 6@12 in..... 4c
" " 14 in. & larger 8c
Gravity Locking Blind Hinges, Sargeant & Co. 70&10
Clark & Co.....70&10
Strap and T Hinges.....60&10

Locks.

Whipple Mfg Co 60
Norwalk Lo Co 60

Nails.

20 to 60d .....$	2 35
8 and 9d	25
6 and 7d	50
4 and 5d.....	75
3d	1 50
2d	2 75
3d fine	3 00
2d fine	3 75
⅝ inch	3 00
3d barrel	1 00
1¼ inch barrel nails.....	1 50
1¼ do do do	1 75
1 do do do	2 50
⅞ do do do	3 00
Cut spikes, all sizes	25
Clinch nails, all sizes.....	1 75
Casing and box nails.....	75
Finishing nails, 3 in.	$1 25
Tobacco nails, ...	50

Nuts and Washers

Nuts, square..... 8c off list.
Nuts, hexagon.....9c. off list.
Washers.....7c off list.

Nuts, Bolts, etc.

Machine Bolts .....dis 75
Bolt Ends .....dis 75
Boiler Patch Bolts.....net list

Picks.

Railroad, 4 to 5 lbs.. doz	$6 60
5 to 6 lbs..	7 20
to 7 lbs..	7 80
7 to 8 lbs..	8 40
Railroad Tamping Pick.. 7 to 8 lbs..doz	10 80
Mill Picks per lb.....	75c

Planes.

Ohio Tool Co .....dis 20
Sciota .....dis 25
Bailey's Pat. Adjstbledis 20@10
Sandusky, fancy .....dis 15
Buckeye .....dis 20
Ogontz .....dis 25

Plumbers', Steam and Gas Fitters' Supplies.

Wrought Iron Pipe new list and dis .....
Gas Pipe--
New List ⅛ to 1¼ black 27½ dis galv'd 17½ dis
1½ and larger black ..47½ dis galv'd 32½ dis
Malleable Iron Fittings..... 25
Grey Iron Fittings ....dis 50
Steam Brass Goods.....dis 55
Water " " .....dis 50
Ludlow Gate Valves ...dis. 20
Register Gauge Cocks net 1 00
Montg'ry Gauge Cocks $1 each
Steam Gauges .....dis. 40
Steam Guages 5 in. net dial per doz 30 00
Scotch Glass Tubes.....dis. 70
Tools.....special.
Duplex Injectors.....net.
Soil Pipe & Fittings, Mott's List.....dis. 30
Sinks, Mott's List.....dis. 25
Copper Bath tubs, sinks, etc.....dis. 25
Galvanized Iron Boilers "Scaifes." .....dis. 50
Marble Slabs, Counter-sunk net per ft.....$ 1 25

Tinners' Tools & Machines.

Machines (P. S. & W.) ....less 10
Tools (P. S. & W.) ..... " 20

Rivets.

Iron ..... dis 40
Tinned.....dis 40
Copper .....dis 40 & 10

Rules.

Stanley..... ....dis. 70 & 10

Shovels and Spades.

Ames' new list, July 1, 1881, ...dis 17½
Old Colony .....dis 17½
Remington's (Lowman's Patent).... .....dis 30
Bishop .....dis 50
Chisholm.....dis 33⅓
Rowland's .....dis 50
Griffiths... .....dis 50

Screws. Dis

Flat head iron or steel [new list] per cent dis. 75
Flat head brass 70
Round head iron or steel 65
Round head brass..... 60
Brass and Silver capped. 50
Japanned, list of Plain Screws.....40&10
Coach, patent Gimlet point, list per 100 70
Lag, taper points..... 70
Bed 10
Machine, flat head, iron. 55
round head, iron 50
Bench, iron .....55&10
wood, beech, per doz $3 10
wood, hickory .....20&10

Saws.

Disston .....dis 20
Disston's Circular .....dis 40
Disston's hand panel, rip, &c.....dis 20
Boynton's lightning cross cut new list .....dis 40
Boynton's circular and mill .....dis 40
Boynton's ice.....dis 25
Boynton's lightning hand panel and rip .....dis 25
Livingston's butcher and kitchen.....dis 20
Livington's framed wood Nos. 101 102 103 104 105 doz $10 8 50 10 7.50 6.20 net
Peace circular & mill...dis 40
Peace hand panel and rip .....dis 25
Peace band saws, all widths.....dis 10

Scales.

Hatch, Counter, No. 171... ℔ doz. $42, dis 45
Union Platform.....$6, dis 45
Fairbanks' .....dis 25
Buffalo Scale Co.....dis 40
Forsyth Scale Co.....dis 30
Howe's.....dis 20&10
Chatillon's Eureka.....dis 25
Family Universal.....dis 50
Scale Beams.....dis 40&10

Sheet and Tank Rivets.

"Norway."

All sizes.....dis. 15

Boiler Rivets—"Albany." ½, ⅝, 11-16, and ¾ in. diam. 4 00
"Standard" ½, ⅝, 11 16 and ¾ inch diameter. 4 00

Sad Irons.

From 4 to 10 lbs.. per lb 3 net
Self-Heating.....℔ doz $9 net
Tailors..℔ doz $18 net
Gleason's Shield and Toilet .....dis 25
Mrs. Pott's Irons, double pointed.....dis 35
Mrs. Pott's Irons, square back.....dis 35
Enterprise Star Irons....dis 35
Combined Fluter and Sad Iron.....℔ doz $15, dis 15

Squares. Dis

Steel or iron, case lots.....55
Try squares and T bevels....40

Spikes—WROUGHT

All lengths by ¼ inch 3½c
do do do 5-16 3
do do do ⅜, 7-16 & ½ in 2¾

Tacks, Brads, &c.

New List Sept. 1, 1882.

Tinned Swedes tacks....dis	30
" American "	30
Swedes tacks, all kinds ...	30
American cut tacks	30
Copper tacks and nails ...	30
Swedes Hungarian nails..	35
Gimp and lace tacks.....	30
" " " tin'd.	30
Furnishing nails	25
Trunk and clout nails....	25
Common and pat. brads...	20
Basket nails.....	20
Brush tacks.....	20
Leathered carpet tacks ...	20
Cigar box nails.....	20
Chair nails	20
Double pointed tacks	40

Extra 10 per cent. on all the above.

Valves. Dis.

Jenkins' Patent Gate Valves.	35
" " Globe	40
" Standard Packing "	20

Vises.

Solid box .....45&50	
Solid "Crown" (A. H. Hildick)....40 to 100 lb, 15c net	
Solid, Peter Wright's 15½	
Solid, Wilkinson's.....14&15	
Parallel, Parker's.....dis 25	
" Simpson .....dis 20	
" Prentiss.....dis 15	
Saw Filers, Hopkins' ℔ doz $17.50, dis 10	
" Wentworth's .. 9 00	
Lowell Hand Vises.....dis 20	
Richardson's Vise and Anvil.....dis 25	

Wrenches.

Coe's genuine.....	50
Girard Standard ....dis 50 & 10	
Mechanics' 10 and 10....dis. 50	
P. S. & W. Mechanics dis 50&10	
Agricultural .....dis 70	
Campfield & Suthff	
Engineer's.....	50
Mechanics'	60
Agricultural	70

Wringers.

2½ inches Universal.....$	30 00
2 inches Eureka.....	30 00

Wire. New List.

Brass and Copper.....dis	15
Bright & annealed, Nos. 0 @ 18	dis 67½
" " Nos. 19 @ 26	dis 67½
" Nos. 27 @ 36	dis 72½
Coppered Nos. 0@18,	dis 62½
Galvanized, Nos. @18, market list,	dis 57½
Tinned, Nos. 0 @ 18,	dis 50@52½
Cast steel.....	dis 55
Tinned Broom Wire, Nos. 18@20	8c lb.
22 to 22	8½c lb ne
Annealed Fence, Nos. 8 and 9	dis 67½
Annealed Grape, Nos. 10 to 14	dis 67½
Galvanized Telegraph, Nos. 7 to 9	6¾c lb net
Galvanized Telegraph, Nos 10 to 11	℔ lb 7¼c
Galvanized Telegraph, No. 12	℔ lb 7¾c
Fence staples	℔ lb 5½@5¾c
Fence Staples, galvanized,	℔ lb 6½@6¾c
Stubs Steel Wire regular	75 per lb net
Barb Wire, painted	5c
Barb Wire, galvanized .	6c
Roebling's Iron and Steel Wire Rope (Roebling List).....	dis 15

LEAD.

Amerc'n, ℔ lb.....4@4¼c	
Bar, ℔ lb.....	5½c
Pipe, ℔ lb 5¼c dis 10 per ct	
Sheet, ℔ lb 5¾c dis 10 per ct	
Tin-lined pipe 15c dis 10 per ct	
Block	45c.
Chilled Shot...	8c

Babbitt Metal.

Genuine, per lb., net	25c
Crescent, "	22c
Extra, "	20c
No. 1 "	15c
No. 2 "	12c
No. 3 "	9c
No. 4 "	5½c

COPPER.

Lake Ingot.....	14¼@14½c
Baltimore	13¾@14c
Arizona	13¾@14c

TINNER'S STOCK.

Tin.

Banca,.....per lb.	22
Straits	"19¾@20¼c
English	" 21¾c
Bar	" 23c
Spelter.....	4¾@5¼c

Tin Plate.

IC 12x12 charcoal.....$	6 00
IC 14x20 do	6 00
IX 14x20 do	7 50
DC 12½x17 do	7 00
DX 12½x17 do	9 00
DXX, 12½x17 do	11 00
DXXX, 12½x17 do.....	12 75
IC, 20x28 do	13 00
IX, 20x28 do	15 75
IC, 14x20, Best Roof.....	5 65
IX, 14x20, do	7 15
IC, 20x28 do	11 50
IX, 20x28 do	14 50
IC, 10x15 Best Coke.....	5 60

Subject to card discount.

Solder.

Half and Half, in bars....13½	
No. 1 do	12
Spelter Solder.....	22
Fat Planished Sheet Iron [A] ..... per lb	10½c
[B] ..... "	9c
Nos 10 15 21 25 to 14 20 24 & 26	
Com 3-10 3-30 3-40 3-75	
Char 5-60 5-60 6-00 6-20	

Sheets over 28 in. wide ¼c extra.

Zinc.

Sheet, cask.....	6¼c
Sheet, open.....	6¾c

BRASS.

Cash prices for Roll and Sheet Brass. For less quantity than 100 lbs. add 3c per lb.

High Bra

All Nos not thinner than No 28, wider than 2 in. not wider than 14 inch 30c
All Nos to No. 28 inclusive, and widths over 14 to 20 in. inclusive 35c
All Nos to No 28, inclusive, and widths over 20 to 30 in. inclusive 38
¼c per lb advance on each No above Nos 28 to 38, inclusive.
All Brass thinner than No. 8 is Platers' Brass at 53c
Sheets 24x48, and all sheets cut to particular sizes and lengths under 30 inches, in width wider than 2 inches 37c

Low Brass.

4c pr lb. more than High Brass
Gilding metal 8c per lb. more than High Brass.
Platers' or Gold Metal
In Bars 48c
Sawed 51c
Planed or Polished...54c

For Slitting.

Metal in width in. to ¼ in. to No. 28, inclusive, 1c per lb advance.
Metal, in width 2 in. to 1 in. thinner than No 28, 2c per lb. advance
Metal, in width ¼ in to ¼ in. thinner than No 28, 5c per lb. advance.
Metal ¼ in. in width and less, 10c per lb. advance.
Any of the above widths cut to particular lengths add 7c per pound.
Sheathing Brazier Copper, Bolts, etc.
All sizes, 16 oz. per sq. foot and over. per lb 22c
nd over per lb.....22c
Brazier's Copper, ordinary sizes, under 16 oz. and over 12 oz. per sq. foot, per lb. 22c
Brazier's Copper, 10 oz and 12 oz. per sq. ft. ..per lb. 23c
Brazier's Copper lighter than 10 oz. per sq. ft...per lb 32c
Circles less than 84 inches in diameter ... per lb. 33c
Circles 84 inches in diameter and over .....per lb. 30c
Segment and Pattern sheets per lb. 33c
Locomotive Fire Box sheets per lb. 30c
Sheathing Copper, over 12 oz. per sq. ft... per lb. 22c
Bolt Copper.....per lb. 38c
Copper Bottoms per lb. 22c
No copper is Sheathing except 14x10 inches, and not to exceed 34 oz. to the sq. ft.

Tinning.

14x48 .....per sheet 6c
All other size sheets, 2½c per square foot. For tinning th sides, double the above amou.

IRON AND STEEL.

Flat Bar.

1½ to 4 by ⅜ to 1 inch.....	1 75
4½ to 6 by ⅜ to 1 inch.....	1 85
1¾ to 6 by 1½ to 1¾ inch	2 15
1¼ & 1½ by ⅜ to ¼	1 85
1 & 1¼ by ⅜ to ¼.....	1 95
⅝ ¾ and ⅞ by .⅜ to ½....2 15	

Round and Square.

1 to 1¾ inch	1 75
2 to 2¾	1 95
2¾ to 3¼	2 25
3¾ to 4	2 75
4¼ to 4½	3 25
4¾ to 5	3 45

Oval.

⅞ to 1¼ inch	2 15
⅝ to ⅞	2 35
½	2 55
⅜	2 95

Heavy Band.

1¾ to 6 by ¼ and 5-16 inch	1 95
1 to 1¾ by ¼ and 5-16 do	2 05
⅜ to ⅝ by ¼ and 5-16 do	2 25
⅜ to ⅝ by ¼ and 5-16 do	2 75

Half Oval and Half Round.

1¾ to 3 inch.....	2.85
⅞ to 1¼	2.25
⅝ to ¾	2.95
½	3.25
⅜	4.75

Light Band.

1¾ to 6 by ¼ to 3-16..... 2 25

Hoops.

1¾ to 4, Nos. 13 to 15.....2	55
1¾ to 2 , Nos 16 to 18.....	265
1¾ to 4 do 13 to 15.....	2 75

1-10 extra for each gauge lighter

Sheet Iron.

No 22 to 24 3	60
No 25 to 26.....3	20
No 27 3	40
No 28 3	60

English Steel.

Best cast..... ℔ lb	16c
Extra cast.....	16½c
Round machinery..	10c
Swaged, cast	18c
Best double shear ...	15½c
Blister, 1st quality..	18c
Refined tool steel....	16½c
Spring calking.....	7¼@7½c
German steel, best ..	11c
2d quality	10c
3d quality	9c
Sheet cast steel, 1st quality	15½c
2d quality	14½c
3d quality	13½c

American Steel.

Best brands of refined cast steel, ¾ to 2 inches..12c
Crucible cast 7c
Open-hearth ditto ... 4½c
Hammer cast steel ... 9c
Spring cast steel..... ¾c
Bessemer and open-hearth spring..... 4½c
Ditto plow..... 3½c
Bessemer machinery 5 @6c
Spring and calking .. 7¼@7c
Tire 4
Sleigh shoe..... 4

Bessemer Steel Tire.

¾ to 1 by 3-32	3½ ℔ lb
¾ to 1 by ¼ to 5-32 ...	3¾ ℔ lb
¾ to 1 by 3-16 to ¾	3¾ ℔ lb

Boiler Plates.

"Paxton"—Standard Quality.

C. No. 1	3 00
C. H. No. 1 Shell	3 50
C. H. No. 1, 50,000.....	4 00
C. H. No. 1 Flange.....	4 50
Extra Heavy	5 50
Homo. Steel 70,000	6 50

Heads, ¼c ℔ lb. extra.

Boiler Tubes. 47½ per cent dis	
Burden Rivets.....	3 75

Miscellaneous Cast Steel.

Auger and auger bit	10
Axle steel for wagons	7
Frog points and plates	8
Frog size bars	8
Pick, hammered	10½
Mattock, beveled	9
Table cutlery	7½
Trap spring steel	10
Pike and cant hook	8½
Coal and granite	9

SCRAP IRON AND OLD METAL.

DEALER'S BUYING PRICES

	Per Ton
No. 1 R R wro't scrap	$17
No. 1 wrought scrap	15 50
No. 1 Machine cast scrap.	12
Stove plate (free from burnt iron)	9 00
Grate bars	8 00
Pipes and flues (clean)	13
Tank iron	13
Hoop and band iron	9
Light sheet iron.....	9
Axle turnings.....	15 00@11 00
Wro't turning (f from cast)	12
Wro't iron, oily drillings	9
Cast borings	8 00
Malleable iron	8 00
Uncut wro't iron boilers	11
Old copper per lb.....	10½
No. 1 H. Brass per lb	11
Heavy yellow Brass do..	9@10
Light Brass per lb	7@8
Scrap Zinc per lb.....	2@3
Tea Lead per lb	3
Heavy Lead per lb	4
Rails	20

PIPE, WROUGHT.

Standard Wrought Iron Lap Welded Steam and Gas Pipe

	Inside Diameter. Inches.	Weight Per Foot.	Price Per Foot Black.	Price Per Foot Galvan'd.
Butt-Welded.	⅛	.24	03	
	¼	.42	03	$0 05
	⅜	.56	03½	0 05½
	½	.84	04½	0 06
	¾	1.12	06	0 07½
	1	1.67	08	0 10½
	1¼	2.24	11	0 14
Lap-Welded.	1½	2.68	21	0 24
	2	3.61	26	0 30
	2½	5.74	38	0 47
	3	7.54	50	0 62
	3½	9.00	67	0 83
	4	10.66	83	1 00
	4½	12.34	1.00	1 25
	5	14.50	1.10	1 50
	6	18.76	1 50	2 00
	7	23.27	2.00	
	8	28.18	2.75	
	9	33.70	3.70	
	10	40.06	4.76	
	11	45.02	5.75	
	12	49.00	6.50	
	13	54.00	7.75	
	14	58.00	9.00	
	15	.....	10.00	

Discount, (car load lots) butt-welded ⅛ inch to ⅜ inches plain .....30 per cent.
Ditto galvanized 20 per cent.
Discounts (car load lots) lap-welded 1¾ inches to 15 in. plain .....50 per cent.
Ditto galvanized 35 per cent.
Discounts on less than car lots, 2½ per cent. less.
Discounts on pipe cut to specified lengths depends on size and waste.

FOR SALE.
AT GREAT REDUCTIONS.

$300 Cash will buy a new first-class Standard Portable Saw Mill; $200 a new 8x12 Horizontal Engine; $100 a new Upright 4-H. P. Engine. Address, E. F. & Son, care Trade Review. tf

FOR SALE.

2 Twenty-four Chamber Clay Presses, Locust wood, with Ohio nozzles, complete, good as new, only used three months; Price, $225.00 each.

NEW MACHINERY.

3 new Pressure Pumps, complete.
2 Agitators, iron frames.
2 Blungers, patent bottoms.
1 Power Wad Mill, for Potters.
1 5 ft. Dry Pan, for Sagger Clay and Grog.
1 7 ft. Dry Pan, for brick or sewer pipe manufacturers.
1 9 ft. Dry Pan, for brick or sewer pipe manufacturers.
Jiggers, of all sizes, complete. New and second hand Engines. Estimates on Potters' complete, also, Brick Yards and Sewer Pipe Works. Oil and Gas Well Rigs, complete.

A. J. BOYCE.
Industrial Foundry and Machine Works,
EAST LIVERPOOL, OHIO.

FOR SALE.

SIX STEEL BUCKETS, capacity 1 yard, 600 ft. 32 lb. rails on stringers, 10x10x24. Also flat car 10 ft. gauge.
E. B. DELAMATER,
271 Franklin Ave, Cleveland, O.

WANTED

TO BUY OR TRADE for a good small or medium-sized SAFE. Address, with price and description, CHAS. BROWN Care Iron Trade Review, Cleveland, O 18tf

WANTED—A man of practical experience, good mechanic, to take charge of a Barrel and Keg Factory. Address Limestone Mining Co., Ashland, Boyd Co., Ky.

FOR SALE,—A half interest in an established and staple manufacturing business within 50 miles of Cleveland. For the right man a good opening. Address J. K. B. tf Care Trade Review, Cleveland, O.

WANTED—A partner or Company to take hold and help introduce a new invention—something new and with big profits. Not much capital required. For particulars address K. K., care Iron Trade Review. tf22

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DAY & CARTER,
tf 122 Water street, Cleveland, O.

WANTED—PARTNER in two or three good paying manufacturing businesses. For particulars address F. H. & Co., care Trade Review.

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SOLICITOR OF PATENTS, COUNSELLOR AND EXPERT, St. Cloud Building, Washington, D. C. 20 years' practice. Daily attendance in Patent Office. Reliable. Fair charges. Prompt personal attention given each case. Good references. Advice free. 1

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Prepared
Roofing.

For Steep or Flat Roofs.
Applied by ordinary workmen at one-third the cost of tin. Circulars and samples free.

T. NEW,
32 John Street, New York.

TO THE
WhiteMountains
And Seashore.

A Series of Three Grand Excursions, via Bee Line—C. C. C. & I. Ry.

July 8, July 29, August 13.

To Niagara Falls,

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ST. LAWRENCE RIVER

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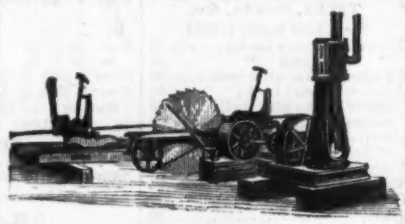
Manufacturers of



IMPROVED
Portable Saw Mills,
Suitable for Threshing Engines.
ALSO,
Direct Acting Engines
Coupled to Mill without Belt.
SEND FOR CIRCULAR. 91

Ætna Machine Works.
F. I. FREEMAN, Prop.,
Manufacturers of
High and Low Speed
Stationary Engines
BOTH
UPRIGHT AND HORIZONTAL.
Geared and Direct Attachment
CIRCULAR SAW MILLS.
Patent Sets and Head Blocks for Saw Mills, and Machinery of all descriptions. Also manufacturers of
The Ætna Engines.

These are an entirely new style of Upright Engines, designed by F. I. Freeman, and
PATENT APPLIED FOR.
They are so constructed that they can be sold for one-half the price for the ordinary style of the same sizes or power, consequently they are by far the
Cheapest Engines in the Market
ÆTNA MACHINE WORKS,
WARREN, O.

FREEMAN'S PORTABLE FIRE ESCAPE.

(Patent Applied for.)
Designed expressly for traveling Men to carry in a Valise.

Also, for Rooms in Hotels, Boarding Houses Etc.

The smallest, lightest and Strongest FIRE ESCAPE Manufactured: Is absolutely Safe, and always ready for use. The Speed can be controlled at will. The No. 2 Machine is only 3 1-2 inches in diameter and 2 inches wide,
One of these Fire Escapes will be sent to any address with privilege of trial, and can be returned if they are not as represented. For sale by all General Hardware Dealers. Reliable Agents wanted. Address,

Ætna Machine Works,
(Opposite N. Y. P. & O. Freight Depot.
WARREN OHIO.

BEECHER & PECK, Manufacturers of
BLAST FORGES,
Peck's Patent Drop Press,
STEEL & IRON DROP FORGES.
Etc. Etc. Etc.
NEW HAVEN, CONN.

WM. B. CLEVELAND,
Suucessor to M. A. Buell,
Electrical Apparatus,
AND TELEGRAPH SUPPLIES,
Electro-Medical Batteries; Call-Bells and Batteries; Learners' Telegraph Instruments; Annunciators, Motors, &c.
Special and Experimental work to order.
No. 144 Superior Street,
Leader Building. 5 CLEVELAND, O.

The Most Durable and Best Selling
Bucket for Chain Pumps.

It has no valves to become obstructed, and no screw joints to become immovable by rust.
Advantages of the Crosby Bucket over all others: 1. It has an air chamber on top, which conducts the air to the bottom of the well. 2. It is self expansive, the base of the bucket being ⅛ of an inch larger at the bottom than bore in the tubes, which allows it to expand, and the groove in the side to contract. 3. The wear comes on the whole side and not on the extreme edge like other buckets. 4.

It contains more solid rubber than three of any other manufacture. Three sizes—1¼ inch for deep wells, 1¼ inch for 40 feet or less, 2 inch for stock pumps. No charge for Territorial Rights. NONE GENUINE unless A. D. Crosby appears in raised letters on base of each Bucket. Send for Price List. Agents wanted in every County. Address A. D. CROSBY, Patentee and General Agent, Cuba, Allegheny Co., New York. For sale by all General Hardware and Pump Dealers. 91 tf

THE LIGHT-RUNNING
NEW HOME
Sewing Machine

Simple Strong Swift & Sure

PERFECT IN EVERY PARTICULAR. NEVER OUT OF ORDER.
HAS NO EQUAL
NEW HOME SEWING MACHINE Co
30 UNION SQUARE NEW YORK.
CHICAGO ILL. ORANGE MASS. ATLANTA GA.
FOR SALE BY

EDWARDS, TOWNSEND & CO.
WHOLESALE GROCERS,
And dealers in
Wines, Liquors and Cigars,
Teas a Specialty.
Nos. 151 & 153 WATER STREET,
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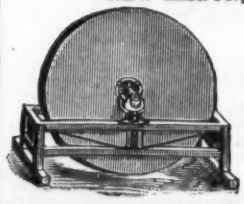


Manufacturer of the celebrated
EXCELSIOR DIAMOND GRIT
GRINDSTONES
The best in the market
FOR WET AND DRY GRINDING,
AND FAST CUTTING.
Manufactured in sizes from 3 feet 6 inches to 8 feet in diameter; in thickness from 6 inches to 25 inches. Orders solicited.
82 JOHN H. O'MARA.

TRAVELER'S REGISTER.

Lake Shore & Michigan Southern.

The time given is the new standard time.

TRAINS GOING EAST.	Arrive. From West.	Depart. For East.
Fast N. Y. Express	*1 05 a m	*12 05 a m
N.Y., Bo't'n & At. Ex.	*6 35 a m	*7 00 a m
Elyria Accommodation	†8 07 a m	.....
Pt. Clinton Accom'd'at'n	†10 35 a m	.....
Buffalo Accommodation	†10 35 a m	†10 50 a m
N. Y and B't'n Fast Ex.	*1 55 p m	*2 25 p m
Cincinnati and St Louis Ex	.....	2 25 p m
Conneaut Accom'dation	.....	†4 22 p m
Night Exp via Norwalk	† 9 40 p m	†10 00 p m
Night Exp via San'sky	9 42 p m	.....
TRAINS GOING WEST.	**Arrive. From East.**	**Depart. For West.**
Fast Limited Express	*11 55 a m	*12 05 a m
Mich. Ex. via Sandusky	*2 15 a m	*2 35 a m
Chi. Ex. via Sandusky	†6 05 a m	6 30 a m
Mich. Ac. via Norwalk	.....	†6 10 a m
Conneaut Accom'dat'n	†8 10 a m	.....
Toledo Ex. via Norwalk	†12 52 p m	†3 00 p m
St. Louis Ex. via San'ky	*12 15 p m	*1 20 p m
Chi. Pac. Ex. via Nor'lk.	*6 00 p m	*12 40 p m
Pt. Clinton Accom'dat'n	.....	†4 20 p m

Sunday trains for Nottingham—Depart 8:30 a. m. and 1:45 p. m., return at 9:05 a. m. and 3:45 p. m.

Reference marks—*Daily. †Daily except Sunday. ‡Daily except Monday.

Cleveland, Columbus Cincinnati & Indianapolis.

Central standard time

DEPARTURES.	
No. 3 Col, Cin. & Ind. Exp.	*7 00 A.M
No. 23 Wheeling Express	6 40
No. 5 Col. Cin. Ind & St. Louis Ex.	*12 35 P.M
No. 9 " " " " "	*6 40
No. 27 Galion Accommodation	4 00
No. 29 Massillon and Uhrichsville Ex	5 00
ARRIVALS.	
No. 8 Col. Cin. Ind. & St. Louis Ex.	*6 40 A.M
No. 20 Uhrichsville & Massillon Exp.	9 00
No 2 Col. Cin. & Ind. Exp	9 50 P.M
No. 14 St. Louis Ind. Cin. & Col. Exp.	*4 50
No. 22 Galion Accommodation	10 00 A.M
No. 26 Wheeling Exp	4 30 P.M
No. 4 Col. Cin. & N. Y. Exp	1 15 A.M

Trains * daily; all others daily, except Sunday

Cleveland & Pittsburgh.

The time given is the central standard time.

	DEPART	ARRIVE.
Pittsburg & Wheeling	8 00 A.M	2 12 P.M
Express	2 00 P.M	6 25
Alliance Accommodation	3 15	9 50 A.M
Ravenna Accommoda	4 50	8 12
Night Express	†11 10 P.M	5 55 A.M
Newburg Accom'dation	10 30 A.M	11 40
Newburg Accom'dation	12 00 M.	1 20 P.M

† Night Express runs daily, except Saturday, by way of Wellaville, and on Saturday by way of Alliance. All other trains daily except Sunday.

"The Nickel Plate."

Ninetieth meridian time.

Going East.	ARRIVE.	DEPART
Buffalo Accom.	10 22 a.m.	10 27 a.m.
Conneaut Accom		3 52 p.m.
Chicago Accom	9 02 p.m.	
Local Freight	11 36 p.m.	12 17 p.m.
Going West.	ARRIVE.	DEPART.
Chicago Accom		6 47 a.m.
Conneaut Accom	8 57 a.m.	
Bellevue Accom	4 52 p.m.	4 57 p.m.
Local Freight	12 44 p.m.	1 22 p.m.

Rocky River Accommodation departs 5 52 a.m.; 1 47 p.m.

Euclid Accommodation departs 7 02 a.m.; 11 42 p.m., 5 17 p.m,

All trains daily except Sunday.

New York, Pennsylvania & Ohio.

New standard central time.

time. DEPARTURES.	a.m.	p.m.
N. Y. & Pitts. Express	* 6 50	11 00
Youngstown & Pitts. Ac	10 35	.....
Fast N. Y. & Pitts. Express		* 2 20
Mahoning Accommodation		4 10
N. Y. and Pitts. Express		11 00
ARRIVALS.	a.m.	p.m.
New York Express	* 6 15	.....
Mahoning Valley Ac	10 20	.....
Fast N. Y. & Pitts. Ex	.....	* 1 05
N. Y. & Pittsburgh Ex	.....	* 6 30
Youngstown & Pitts. Ac	.....	9 45

* Sunday trains.

Valley Railway.

Central Standard time.

	Arrive.
From Valley Junct. and Canton	*10:04 A.M.
From Canton, Pittsburgh an intermediate points	†2 14 P.M.
From Valley Junct. and Canton	5:47 P.M.
	Depart.
To Akron, Canton and Marietta	†7:40 A.M.
To Akron, Canton and Mahoning Valley points	*2:70 P.M.
To Akron and Canton	†5:47 P.M
To Akron, Canton & Valley Junct.	‡8:40 A.M.

*Daily. †Daily except Sunday. ‡Sunday only. Train leave depot, South Water street,

Connotton Valley Railway.

Standard Time.

Trains arrive:	A. M.	P. M.
Canton, Sherrodsville & Coshe'ton	9 47	7 07
Canton & Coshocton		1 02
Kent accommodation	7 37	

Newburgh 7:02 a. m., 8:32 a. m. 1:52 p. m., 4:17 p.m., 6:42 p. m., 10:07 p.m.

Trains leave Cleveland,	A. M.	P. M.
Canton, Coshocton & Sherrodsville	7 02	
Canton & Sherrodsville		2 07
Canton & Coshocton	7 02	3 42
Kent accommodation		5 12

Cleveland and Newburgh, 6:12 a. m., 7:47 a.m., 10:32 a.m., 2:52 p.m., 5:52 p.m., 5:12 p.m.

Newburgh and Bedford 10:32 p.m.

Trains Sunday only depart for Bedford 8:07 p.m., 10:07 a.m., 9:02 p.m.; Newburgh, 1:02 p.m.; Kent Accommodation 5;12 p.m.

Trains arrive, Kent Accommodation 7:37 p.m. Bedford 8:4 ; p.m., 1:27 p m., 5:55 p.m.; Newburgh 2:32.

Depot corner Huron and Ontario streets.

Cleveland, Akron & Columbus Railroad.

Cleveland, Akron & Columbus Railroad, running over Cleveland & Pittsburgh Railroad to Hudson, for Akron, Columbus, etc.

	ARRIVE.	DEPART.
Mail	2 30 P.M	8 25 A.M
Express	7 30	2 00 P.M
Accommodation	10 10 A.M	3 45 P.M

Cleveland, Lorain & Wheeling.

ARRIVALS.	
Wheeling & Cleveland Express	6 45 P.M
Uhrichsville Express	9 10 A.M
DEPARTURES.	
Wheeling & Cleveland Express	6 40 A.M
Uhrichsville Express	4 30 P.M

The Cleveland, Mt. Vernon and Delaware RAILROAD.

"Cleveland, Akron & Columbus."

In effect November 18, 1883, based on Central Standard Time.

GOING NORTH.

STATIONS.	No. 1.	No. 3.	No. 5.	No. 7.
Leave				
Columbus	6 45	11 40	.....	16 50
Westerville	7 10	12 05	.....	17 18
Centerburg	7 52	12 47	.....	18 04
Mt. Vernon	8 37 B	13 31 D	.....	18 50 S
Gambier	8 49	13 41	.....	19 01
Danville	9 09	14 01	.....	19 23
Gann	9 21	14 11	.....	19 35
Millersburg	10 14	14 59	5 30am	.....
Fredricksb'g	10 37	15 19	5 51	.....
Orrville	11 12	15 50	6 50 B	.....
Warwick	11 36	16 11	7 16	.....
Clinton	11 43	16 16	7 23	.....
Akron	12 15	16 46	7 57	.....
C'yahoga F's	12 30	16 58	8 11	.....
Hudson	12 50	17 15	8 30	.....
Ar. Clevel'd	14 12	18 25	9 50	.....

GOING SOUTH.

	No. 2	No. 4.	No. 6.	No. 10.
Leave.				
Cleveland	8 00	14 00	15 15	16 50
Hudson	9 17	15 10	16 30	18 15
Cuyahoga F's.	9 35	15 28	16 54	18 50
Akron	9 51	15 44	17 11	19 45
Clinton	10 22	16 16	17 43	.....
Warwick	10 26	16 21	17 48	.....
Orrville	10 51	16 47	18 14	.....
Fredricksburg	11 22	17 18	18 48	.....
Millersburg	11 45	17 40	19 10	No. 8.
Gann	12 34	18 30	.....	5 50
Danville	12 44	18 41	.....	6 0
Gambier	13 04	19 01	.....	6 21
Mt. Vernon	13 29 D	19 26 S	.....	6 50 B
Centerburg	14 01	20 00	.....	7 25
Westerville	14 45	20 45	.....	8 13
Columbus arr.	15 10	21 10	.....	8 40

The system used in the above table consists in avoiding the confusing division of the day into two equal portions of 12 hours each, and emp'oying instead a continuous count from 1 to 24. The days begins at Midnight, as ur der the common system, but there is no possibility of confusion between the forenoon and afternoon hours.

E. T. AFFLECK, Gen. Pass. Ag't, Columbus, O.
GEO. D. WALKER, RECEIVER.
N. MONSARRAT, Gen'l Supt.

NEW YORK, PENNSYLVANIA AND OHIO RAILROAD.

New York, Boston and the East.

The shortest and quickest route to Pittsburgh, Washington, Baltimore and the Southeast.

Central or Ninetieth Meridian time, 33 minutes slower than Cleveland city time.

Until further notice trains will leave the new Central Depot, South Water Street and Viaduct as follows:

6 50A.M. LIGHTNING EXPRESS (daily sleeping and hotel coaches from Leavittsburg. 8:35 a.m. To New York, Albany and Boston without change. Arrives at Meadville 10:40 a.m., (dinner); Franklin, 12:08 p.m. Oil City, 12:30 p.m.; Corry, 12: 5 p.m.; Jamestown, (Lake Chatauqua) 1:35 p. m.; Buffalo, 5:30 p. m.; Rochester, 8:20 p.m.; Hornellsville, 6:00 p. m.; (supper); Corning, 7:25 p.m.; Elmira, 8:05 p.m.; Binghampton, 10:05 p.m.; Albany, 5:00 a.m.; Boston, 1:45 p.m.; arriving at New York, 6:15 a.m.

2:20P.M. LIMITED EXPRESS, Pull-Sleeper Cleveland to New York, (daily). Arrives at Meadville, 6:30 p. m.; Jamestown, 8:47 p. m.; Salamanca, 9:45 p. m.; New York, 10:10 a. m.

11:00 P.M. NIGHT EXPRESS, (daily except Sunday), Sleeping Coach from Leavittsburg to New York without change. Arrives at Youngstown, 1:50 a.m.; Pittsburgh, 5:50 a. m.; Washington 0:00 a. m. Baltimore 00:00 p. m.; Meadville, 3:25 a. m. Corry, 4:59 a.m.; Jamestown, 5:57 a.m.; Buffalo, 9:20 a.m.; Rochester, 12:58 p. m.; Hornellsville 11:00 a.m.; Corning, 12:07 p. m.; Elmira 0:40 p. m.; Binghampton, 2:19 p.m.; New York 9:10 p.m.

2:20 P.M. PITTSBURGH EXPRESS, daily, through without change. Parlor Car, Cleveland to Pittsburgh, arrives at Youngstown, 5:00 p.m.; Pittsburgh, 8:02 p.m.; Washington, 7:09 a.m.; Baltimore, 8:19 a.m.

4:10 P.M. MAHONING ACCOMMODATION, stopping at all way stations. Arrives at Youngstown, 6:55 p.m; Sharon, 8:01 p.m; Sharpsville 8:10 p. m; connects at Leavittsburg with train No. 20 for Meadville and intermediate points, arrives at Meadville, 11:05 p.m. Pittsburgh, 00:00 p. m.

6:50 A.M. PITTSBURGH EXPRESS, —(daily) through without change. Arrives at Youngstown, 9:30 a.m.; Sharon, 10:30 a.m.; Sharpsville, 10:40 a.m.; Pittsburgh, 12:45 p.m. Returning, leave Pittsburgh, 4:15 a.m., 7:45 a.m., and 12:55 p. m. and 3:45 p.m.

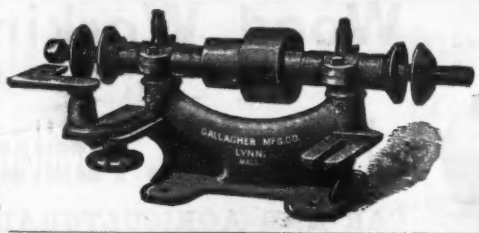
10:35 A.M. YOUNGSTOWN & PITTSBURGH Accommodation, stopping at all Way Stations, arriving at Youngstown 1:30 p.m.; Pittsburgh, 5:45 p.m. Trains arrive at Cleveland, 6:15 a.m., 6:30 p. m., 10:30 a. m 1:05 p.m., and 9:45 p.m.

☞ This is the only route by which passengers can reach Corry, Elmira, Binghampton, New York City, and intermediate points WITHOUT CHANGE. No change to Boston and New England cities.

Baggage Checked Through to All Points East

☞ Through Tickets and information regarding the route can be obtained at the office 131 Bank street, and at new Depot of New York, Pennsylvania and Ohio Railway, uth Water street and Viaduct, Cleveland.

A. B. CLARK, Gen. Pa Agt., Cleveland, Ohio.
M. L. FOUTS, M. FERRIS, Pass. Agt., 131 Bank st., Gen. Mangr Cleveland.



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UNIVERSAL AND CHAMPION RATCHET DRILLS,

Buffing Lathes, Speed Indicators, Cornice and Tinners' Shears. Send for circular. 18 STATE STREET, Lynn, Mass., U. S. A.

TO STEAM USERS.

I will Remove and Prevent Scale in any Steam Boiler, or make no charge. My remedy will also neutralize the most destructive waters, and prevent

GROOVING, PITTING AND WASTING OF IRON,

Which causes so many Boiler explosions.

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CASTINGS
For Machinery and Rolling Mills.

Car Wheels
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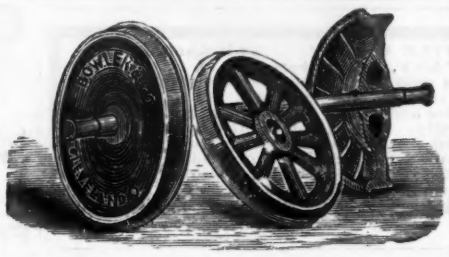

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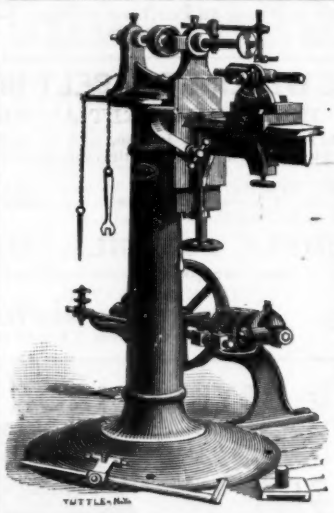

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149-143 Center street, (Cornell's Building) NEW YORK.
Send for illustrated Catalogue.

IMPROVED

DRILLS

This cut represents my No. 2 Improved Drill, double geared, so arranged that by moving the crank from A to B, it will give a slow motion, for heavy drilling, to the spindle, increasing the power double.

Price $36 00.

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NEW BRIGHTON, PA.,

Manufacturers of all kinds of

Coal Picks, Clay Picks, Mattocks,

Stone Picks, Coal Wedges, Coal and Clay Sledges, Stone Wedges, and all kinds of

Quarrying and Mining Tools.

Also, Limestone Picks, Mill Picks, etc. Coal, Clay, Mining and Quarrying Tools a Specialty. Light and Heavy Forging, both in Iron and Steel, of all Patterns, executed with neatness and dispatch.

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Wood Rim Pulleys
of all sizes for double and single belts.
Also, SHAFTING, HANGERS and IRON PULLEYS.
Responsible agents wanted where I have none. Address,
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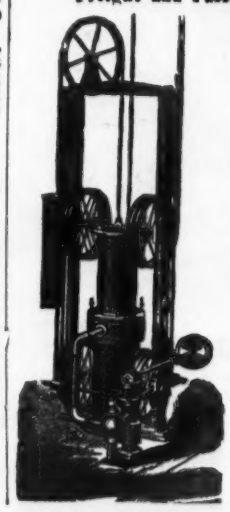
Hydraulic, Hand and Steam Power
Freight and Passenger Elevators.



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The Picturesque Lehigh Valley Route.

Three through trains with Pullman cars attached are now run via by this beautiful scenic route, between Suspension Bridge, Buffalo, New York and Philadelhpia, leaving Suspension Bridge 8:18 A. M. 4:10 and 7:45 P. M, Buffalo 9:00 A. M. and 4:40 and 10;00 P. M., connecting with all trains from the West.

Passengers between the East and West passing over the famed LEHIGH VALLEY ROAD will experience the pleasure of a trip through the most magnificent and picturesque scenery in the world, presenting an ever varying panorama of delightful surprises.

Double track, steel rails, magnificent road bed and unrivaled equipment, all combine to make the LEHIGH VALLEY the favorite and most desirable route between the East and the West.

Anthaacite Coal is used entirely, guaranteeing to passengers perfect freedom from the dense volumes of smoke that so greatly annoy passengers on lines using Bituminous Coal. E. B. BYINGTON,
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Steam Navigation Company's Steamers City of Detroit—Northwest between Cleveland and Detroit--Leave from foot of Third St. Detroit at 10 p. m.--Leave from 23 River St. Cleveland at 8.30 p. m.

THE $2.25 ROUTE.
Week days--Standard Time.

THE $3.00 ROUTE.
City of Mackinac—City of Cleveland
Leave from foot of Wayne St. Detroit.
Wednesdays and Fridays at 10 A. M.
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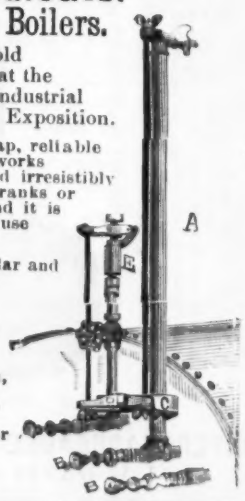
Walker's Automatic Low Water Indicator
For Steam Boilers.

Awarded the Gold Medal at the Cincinnati Industrial Exposition.



It is simple, cheap, reliable and durable It works automatically and irresistibly without floats, cranks or fusible plugs, and it is always ready for use after action.

Write for Circular and Price List.

J. L. Walker.
Manufacturer,
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Mention this paper.

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GIVE HATCH SIZE, ELEVATION OF **ELEVATORS.**
BUILDING, & SEND FOR ILLUSTRATED CIRCULAR
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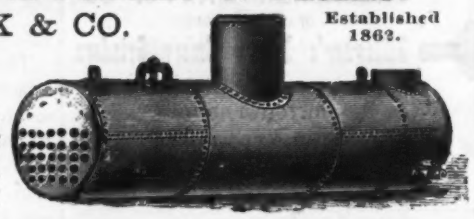
WM. B. POLLOCK & CO.

Established 1863.

YOUNGSTOWN, O.



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Is so constructed that it is not affected by the Feeder becoming heated, and is operated by turning a single lever. No globe valves are used. All parts are interchangeable, and needs no adjustment for varying steam pressure. Works under a pressure of from 20 to 150 pounds on a lift of 25 feet.

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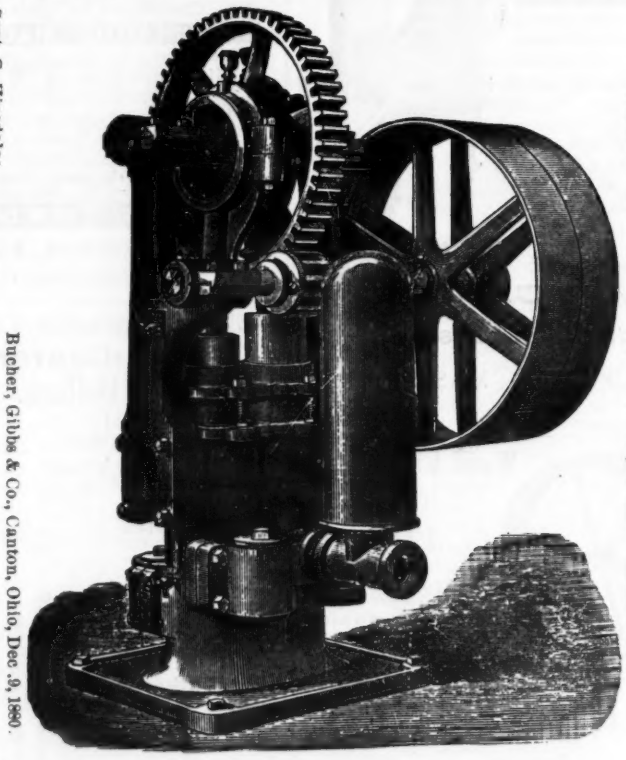

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Respectfully,
BUCHER, GIBBS & CO.
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Arthur Kirtland, Agt.,
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Davis's Patent, May, 1876.

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Trade Mark Patented—Paint Patented

Order direct from the
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And get the genuine article, and save liability of suit for using an article made in violation of the patents issued to Wm. Green and now owned by this Company.

IRON CLAD PAINT is the most durable, most fire-proof, and CHEAPEST PAINT MADE.

Furnished both Dry and Ground in Oil.

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Wood Working Machinery

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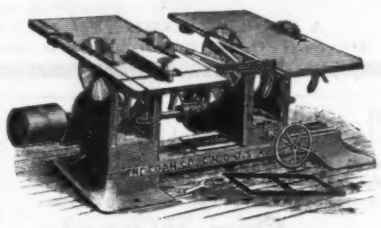

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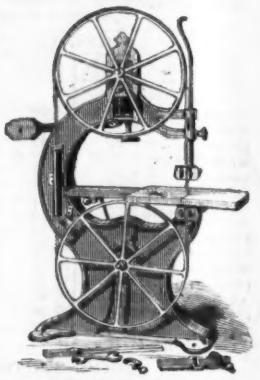
A FULL LINE OF LATEST AND MOST IMPROVED CONSTRUCTION.



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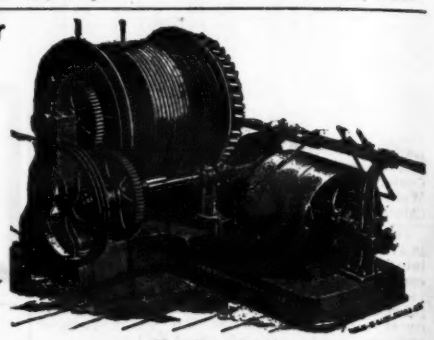

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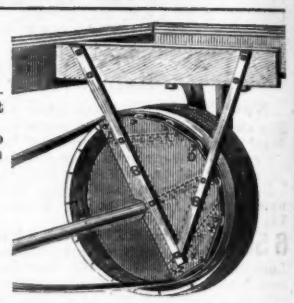

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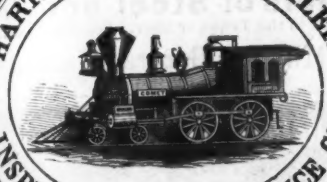

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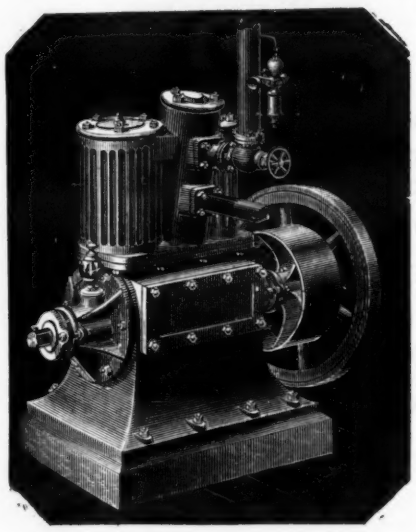

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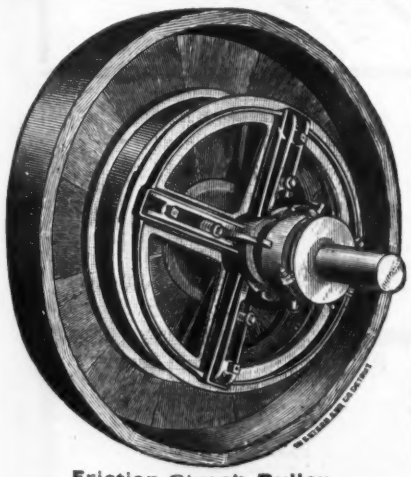

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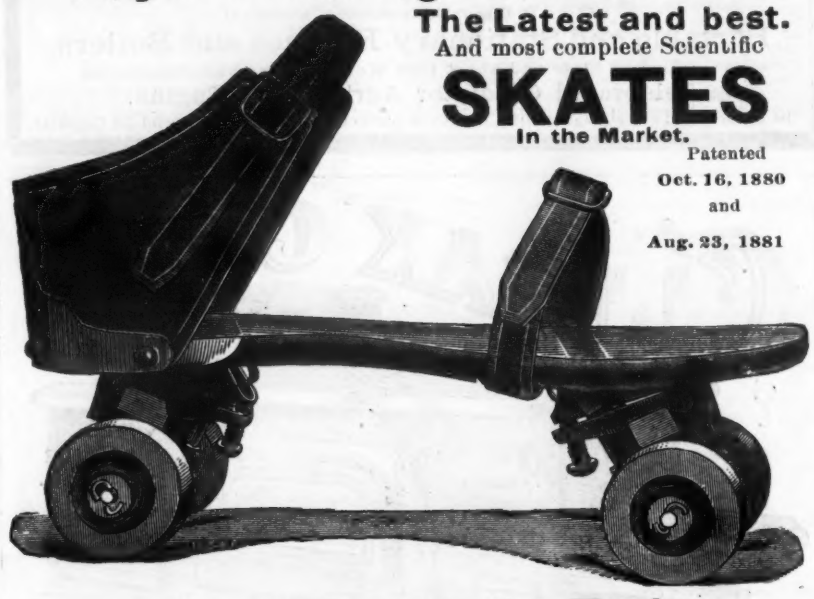

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FROM ¼ TO 15,000 Lbs. WEIGHT,
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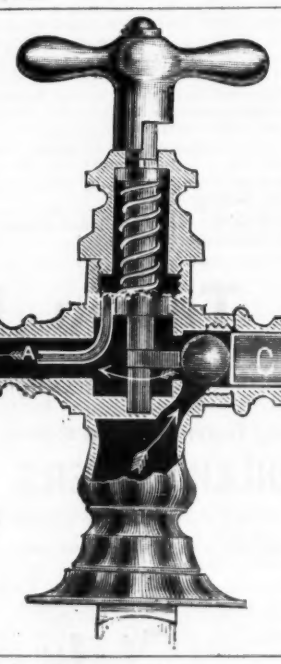
THE SIMPLEST

THE MOST DURABLE,

IN FACT,

The Best Faucet Made



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The Hard Rubber Ball Valve closes with the water pressure, and not against it, hence always tight. The Ball Valve never rests twice alike. Easily and quickly repaired.
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TIME TABLE OF PASSENGER TRAINS.
In effect June 8, 1884.
Central Standard Time.

GOING SOUTH.				GOING NORTH.		
5 Acc	3 Ind. Ex.	1 C&L M'il	STATIONS.	2 C&L M'il	4 Ind. Ex.	6 Acc.
AM.			Via M.C.R.R.	P.M.		P.M.
9 00	....	....	....Detroit....	11 59	....	6.25
P.M.	AM.	AM.		P.M	P.M.	AM.
4.00	5.50	11.15	Fort Wayne	3.50	10.10	10 45
4.55	6.22	11.52	..Ossian....	3.14	9.38	9.38
5.08	6.28	11.59	..Kingsland..	3 07	9.31	9.26
5.35	6 43	12.14	...Bluffton..	2.52	9.17	9 00
6.32	7.12	12.47	..Montpelier.	2 17	8.47	8 05
7.08	7.30	1 07	...Hartford...	1.54	8.27	7.30
7 35	7 46	1.28	.....Eaton.....	1.37	8.12	7.00
8 20	8 10	1.50	...Muncie....	1.10	7 50	6.15
P.M.	AM.	P.M.	Via C.C.C.&I	AM.	P.M.	
10.35	10.35	5.50	.Indianapolis	10.10	5.25	.....
AM.		AM.				
8.00	....	8.20	..St. Louis..	....	....	.....
....	8.28	P.M. 2 03	..McCowan..	P.M. 12.56	P.M. 7.29	.....
.....	8.40	2.15	..Springport	12.44	7.17	.....
.....	8.49	2.24	...Summit..	12 35	7 07	.....
.....	9.06	2.41	..New Castle	12.20	6.50	.....
				AM.		
.....	.....	3.00	.New Lisbon	11 08	....	.....
.....	.....	3.15	..Cambridge	10 47	....	.....
.....	.....	3.20	....Milton..	10.42	....	.....
			Via W.W.R.R			
.....	.....	3.35	...Beeson..	10.30	....	.....
.....	.....	3 52	.Connorsville	10.10	....	.....
.....	.....	4.32	..Milamora	9.24	....	.....
.....	.....	4.50	.Brookville	9.03	....	.....
.....	.....	5.34	..Harrison..	8.16	....	.....
			Via C.I.,St.L. & C.Ry			
.....	.....	P.M. 5.52	.Valley June	7.57	....	.....
.....	.....	6.50	Cincinnati	7.15	....	.....
.....	AM. 9.0	P.M. 2.55	.New Castle	P.M. 12.20	P.M. 6.56	.....
				AM.		
.....	9 25	3.14	..Spiceland,	11.59	6.34	.....
.....	9.31	3.21	...Dunreith..	11.53	6.28	.....
.....	10 05	4.00	..Rushville..	11.25	6 00	.....
.....	.....	5.15	Greensburg,	10.28	....	.....
.....	.....	7.10	..Cincinnati	8.10	....	.....
.....	.....	6.10	North Vernon	9 2[illegible]	....	.....
.....	.....	P.M	Via O.&M.R'y	A M	....	.....
.....	.....	8 0	..Louisville	7 00	....	.....

All trains daily except Sunday. Tourists' round trip tickets to all Northern and Northwestern Summer Resorts. Round trip tickets to all points South are now on sale at greatly reduced rates. ROBT. F. KINNAIRD,
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At Chicago, Passenger Trains arrive at and leave Union Depot, Van Buren street.

Following is the time in effect June 1st, 1884, and until further notice:

GOING EAST.

	Local Pass'n'gr	Local Pass'ngr.	Conneaut, Accom,
Lv. Chicago	7 50 am	.....	.....
Ar. Valparaiso	9 45	.....	.....
" Ft. Wayne	1 30 pm	.....	.....
" New Haven	2 05	.....	.....
" West Leipsic	3 56	.....	.....
" Arcadia	4 49	.....	.....
" Fostoria	5 00	.....	.....
" Gr. Springs	5 45	.....	.....
" Bellevue	6 10	.....	.....
Lv Bellevue	6 20	7 55 am	.....
Ar Lorain	7 50	9 16	.....
Ar Cleveland	9 02 pm	10 22	.....
Lv Cleveland	.....	10 27	3 52 pm
Ar Painesville	.....	11 33	5 05
" Ashtabula	.....	12 25 pm	6 03
" Conneaut	.....	12 50	6 30
" Erie	.....	2 09	.....
" Dunkirk	.....	3 47	.....
" Buffalo	.....	5 20	.....

GOING WEST.

	Local Pass'n'gr.	Local Pass'ng r.	Con'eaut Accom.
Lv Buffalo	.....	9 50 am	.....
Ar Dunkirk	.....	11 24	.....
" Erie	.....	1 23 pm	Leave.
" Conneaut	.....	2 20	6 15 am
" Ashtabula	.....	2 51	6 46
" Painesville	.....	3 44	7 43
" Cleveland	.....	4 52	8 55
Lv Cleveland	6 47 am	4 57	.....
Ar Lorain	7 53	6 12	.....
Ar Bellevue	9 10	7 35	.....
Lv Bellevue	9 20	.....	.....
Ar Gr. Springs	9 44	.....	.....
" Fostoria	10 22	.....	.....
" Arcadia	10 34	.....	.....
" West Leipsic	11 30	.....	.....
" New Haven	1 35 pm	.....	.....
" Ft Wayne	1 50	.....	.....
" Valparaiso	5 42	.....	.....
" Chicago	7 50	.....	.....

Through tickets to all points are on sale at principal offices of the Company, at Lowest Rates, for any class of tickets desired. Baggage checked to destination. For rates or information call on nearest Agent of the Company, or address

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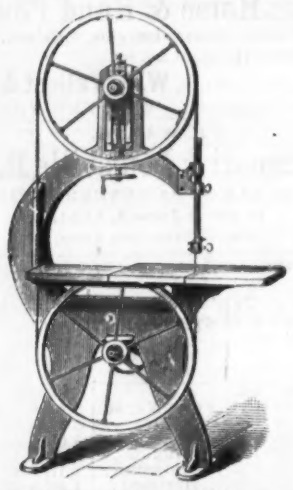

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The two smaller sizes will saw hard wood 12 in. thick, the largest 16 in. thick. They are made of the best material and are well made.

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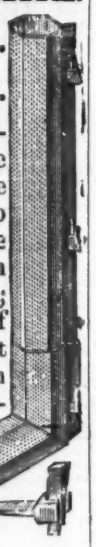

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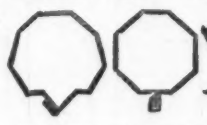

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Portable and Stationary Engines and Boilers,

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Specially Designed for the Western Market

OVEN NO. 8—20x21½x13 Inches. OVEN NO. 9—22x23½x14 Inches.

Has peculiar and important features that make it the best operating stove in the market, and commend it to the favorable notice of dealers who desire a first class stove.

It is constructed with our patent flue, which descends in the rear and ascends in front between oven and fire-box, forming a wide flue around back, bottom and front of oven, insuring an easy draft and uniform heating of all parts of oven.

The Reservoir is of planished copper, with deep, stamped pit, protected with cast iron, and is effectually heated without an extra damper. By removing Reservoir and supplying its place with cover plates, a complete six-hole stove is obtained

The fire-back is in three heavy interchangeable pieces. A water-back is provided which occupies the same space as fire-back, heats perfectly and does not retard the heating of oven, for reasons of the intervening flue between it and oven.

The grate is hinged at its extreme back edge, and when dumped gives a clear opening into a large ash-pan. It can be partially dropped to remove clinkers from the front.

A receptacle for the covers, when removed from top of stove, is hung on swing bracket under front hearth.

Its neat design, nicely polished edges, nickeled panel plates and trimmings give it a very attractive appearance.

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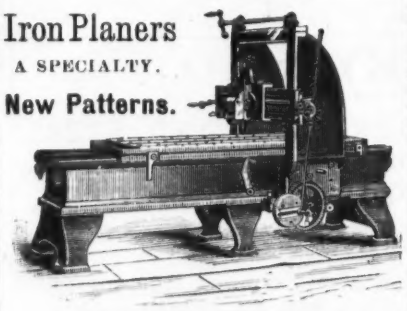

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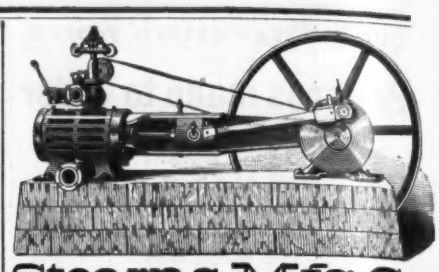

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Engines from 15 to 400 Horse Power,

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Saw Mill and General Machinery.

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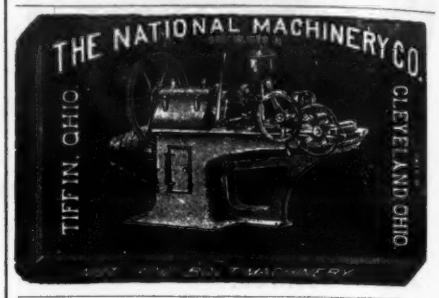

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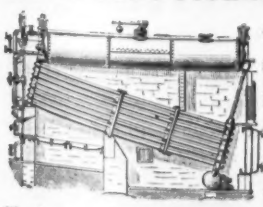

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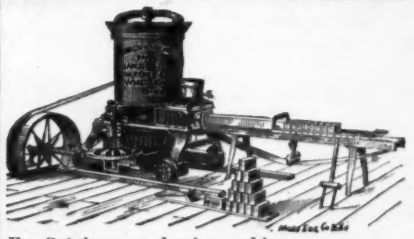

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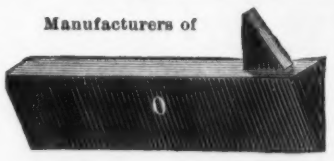

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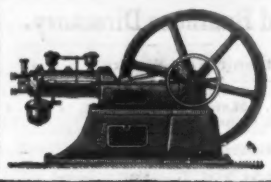

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Over 14,000 Working.
Gas consumption 20 to 70 per cent. less than that of any other engine.
Sizes: 1 to 25 indicated horse power.
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SCREW LEVER
Dump and Coal Car.
(M. VAN WORMER'S PATENTS.)
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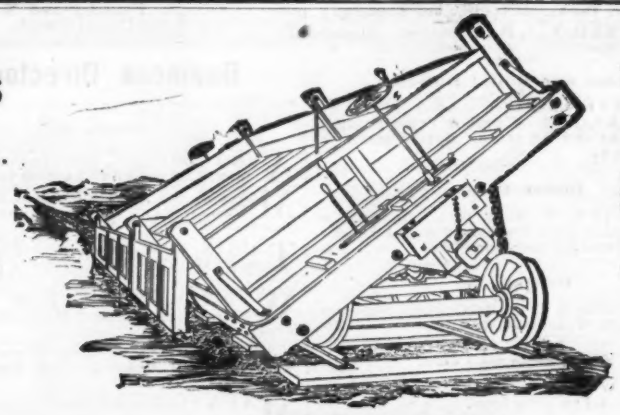

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DISCHARGING ITS LOAD INSTANTLY.
The device can be applied to flat cars. The car is under perfect control at all times, and can be held at any elevation or dumped suddenly if desired. For construction trains, cars with this device would be invaluable
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Lehigh Valley R. R., Bethlehem, Pa.
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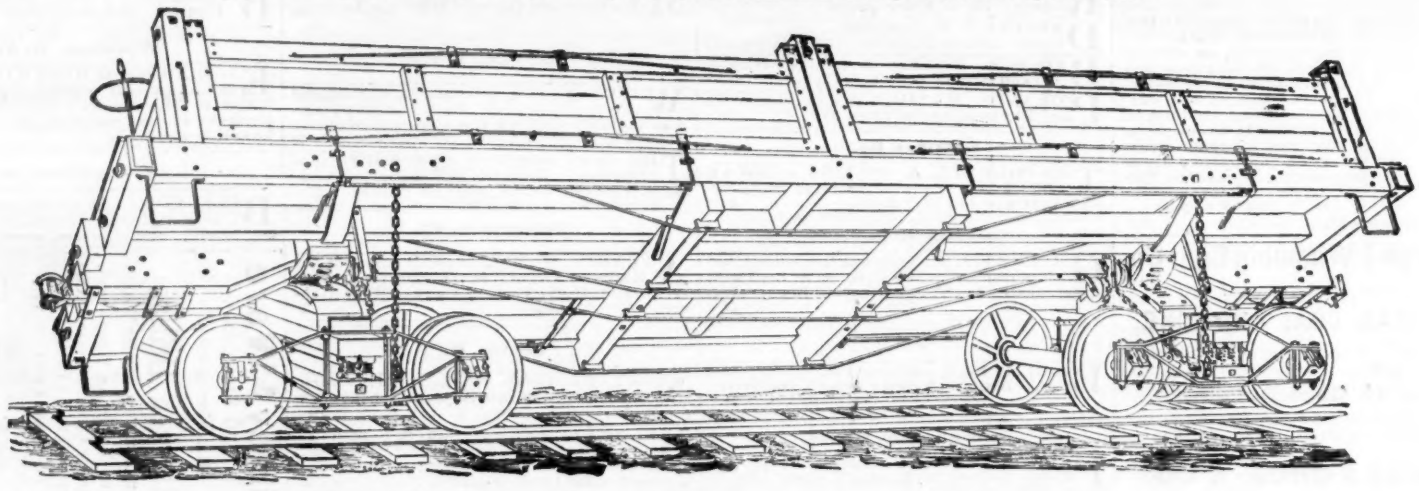
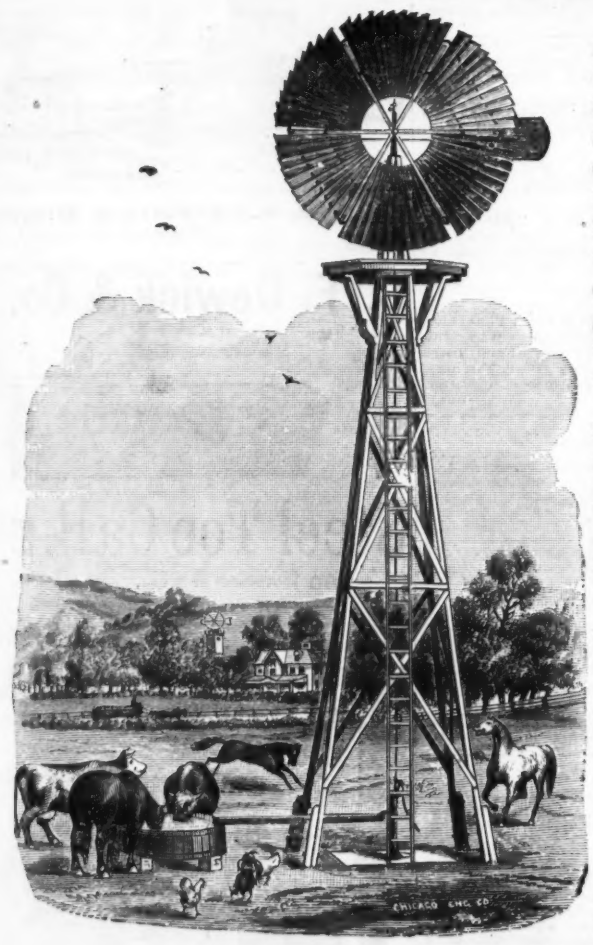


SIDE VIEW.

WIND - MILLS.



We desire to call the attention of parties wanting Wind Mills for IRRIGATION, DRAINAGE, TOWN or SUBURBAN WATER WORKS, FIRE RESERVOIRS, RAILWAY SUPPLY or POWER GEARED MILLS for any purpose, the **Eclipse Wind Mill,** the original Solid Wheel Mill. Our principle is no experiment, having been tested *over twelve years,* and is very simple and effective—consisting of a Wind Wheel, Side Vane and Flexible Rudder, so arranged as to act automatically together. By referring to the cut a front view of the Mill will be seen, showing the Wheel and the side Vane. As the wind increases to a gale it bears on this Side Vane (which is attached to the same casting as the Wheel), and blows it with the Wheel around out of the wind into a parallel position with the Rudder, thus getting out of the way and presenting no resistance to the wind, the Mill rests without strain. As the gale dies down the wheel is brought back into the wind by the automatic action of the weight, the resistance of which is increased as the Tail and Wheel approach, and decrease as they recede.

The Wheel is solid—not a loose section and being mounted on the same casting as the Rudder, they act as a balance to each other. The Rudder being in an exact right-angle line back from the Wheel, the wind as it passes the Wheel strikes both sides of the rudder with even force, and thus steers the Wheel steadily and straight against the wind; and hence our Wheel is always full in the wind. Mills setting either Wheel or Rudder at one side of the vertical center cannot get full in the wind, because the Wheel or Tail setting off to one side of the vertical axis, acting as a Side Vane for itself, allows the wind to press with more force on the Rudder from the side opposite, and consequentiy must always be steering the Mill just so much out of the wind, and therefore loses power.

We shall publish from time to time, letters from parties using the Eclipse Mills which will convey a better idea of the popularity of the mill than anything that could be said in any other form.

Cuyahoga Falls, O., February 20th, 1883.

To whom it may concern: I have used the Eclipse Wind Mill some seven years. It has in all respects been all it was warranted to be, and has given me entire satisfaction. E. N. SILL.

Office of SWOPE, HUGHES & WALTZ.
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Messrs. Fairbanks, Morse & Co., Cleveland, O. Gentlemen: Yours received and contents noted. In reply would say I have used an Eclipse Wind Mill about four years and has given entire satisfaction. It is in good order to-day as the first day it was put up. I put one coat of paint on it which is all the expense it has been to me. Respectfully, JOHN HUGHES.

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The sole manufacturers under all the patents of Chas. F. Brush for

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4		6	4	565.00
5	10		8	900.00
5		15	8	900.00
6	20		14	1,500 00
6		30	14	1,500.00
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Single Lamps, $50.00; Double Lamps, $60.00. Send for details.

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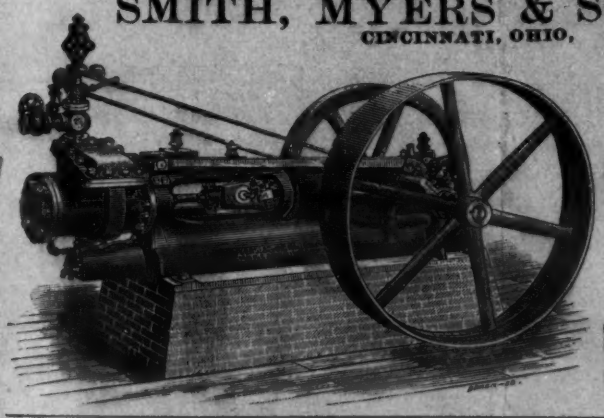
CINCINNATI, OHIO.



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PLAIN SIDE VALVE AND AUTOMATIC CUT-OFF

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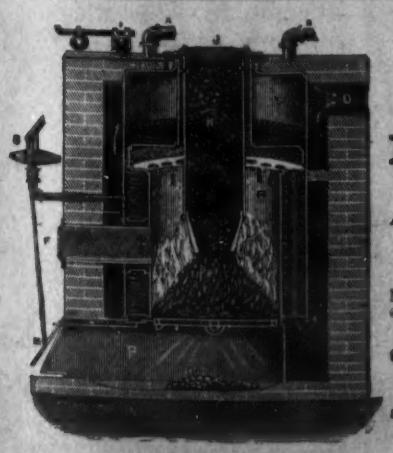

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All kinds of Boilers and Sheet Iron Work.

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TINNING AND JAPANNING A SPECIALTY.

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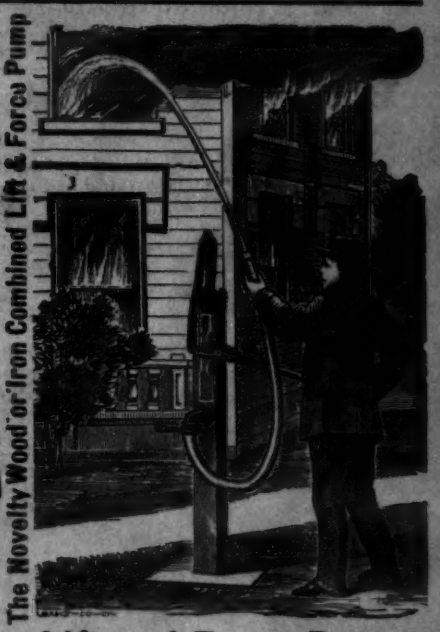

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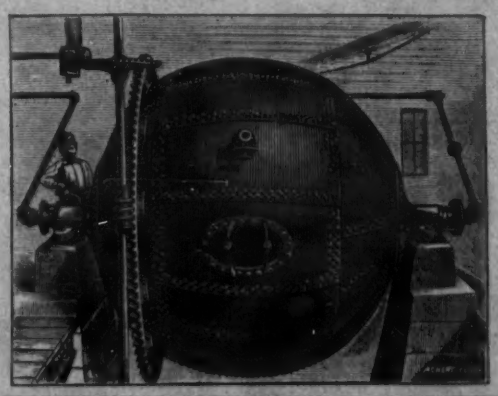

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For Mining, Railroad or Steamboat use, Paper Mill, Chemical or Gas Works Tannery, Brewery or Sugar Refinery, Draining Quarries, Cellars or Plantations, Irrigating or Hydraulic Mining, Sinking Foundations, Coffer Dam, Sewer, Well Sinking and other Contractors' Work, or Raising Water for any kind of Manufacturing or Fire Purpose, write for an illustrated descriptive book on the NEW PULSOMETER, containing greatly reduced prices, hundreds of testimonials etc. Mailed free. Prices 100 per cent. lower than other. Every pump tested before shipment and guaranteed as represented.

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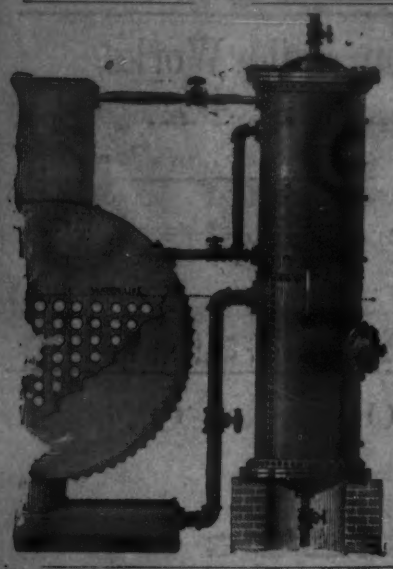

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Feed-Water Purifier,

(Patented March 18, 1883.)

ADVANTAGES CLAIMED FOR

STILLWELL'S FEED-WATER PURIFIER

OVER ALL OTHERS:

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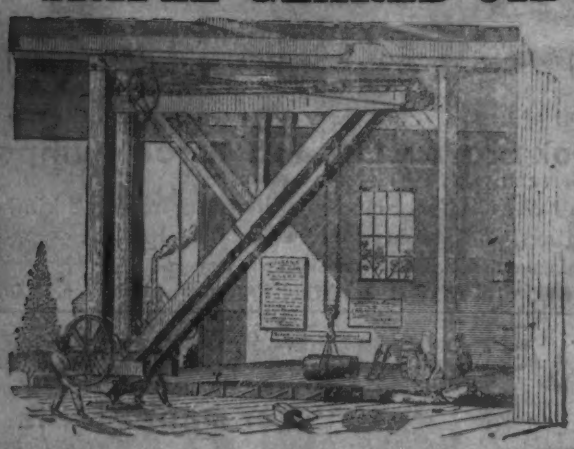

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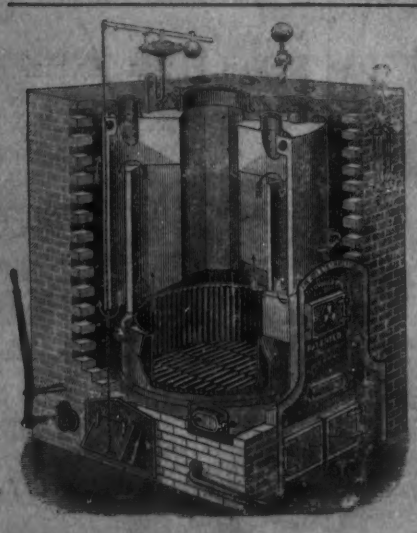

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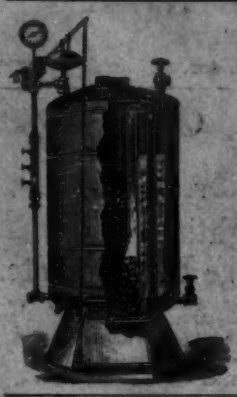

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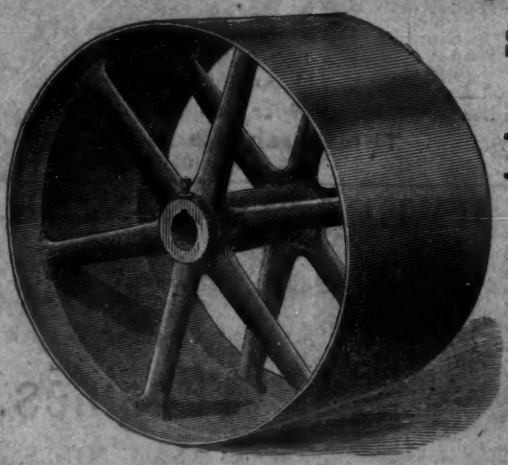

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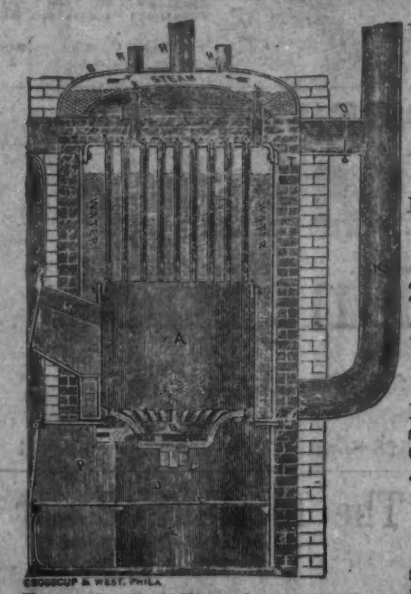

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